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Annual Electrical Space Heating Section begins on pages 18 & 33

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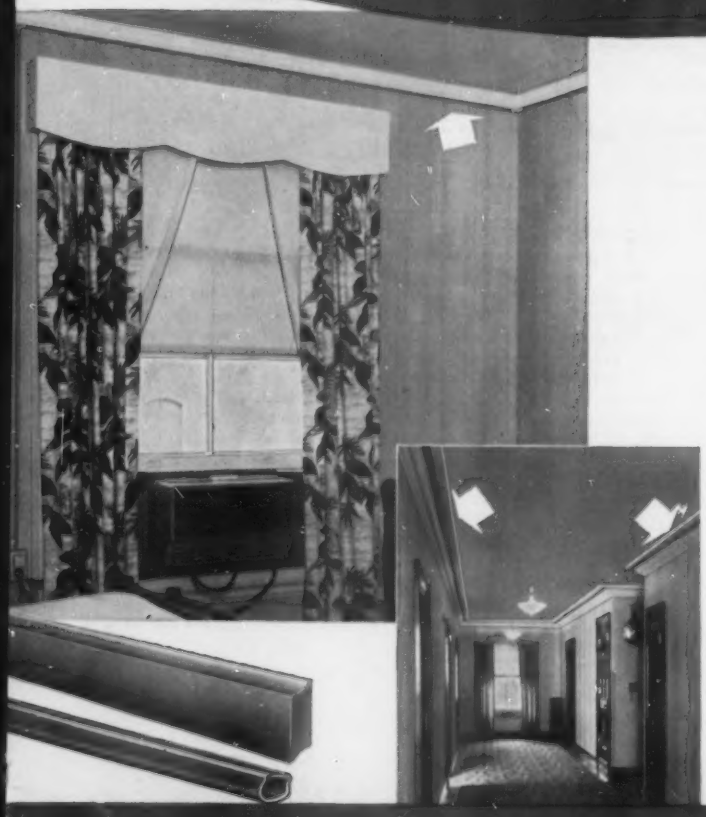

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Volume 36 **Number 8**

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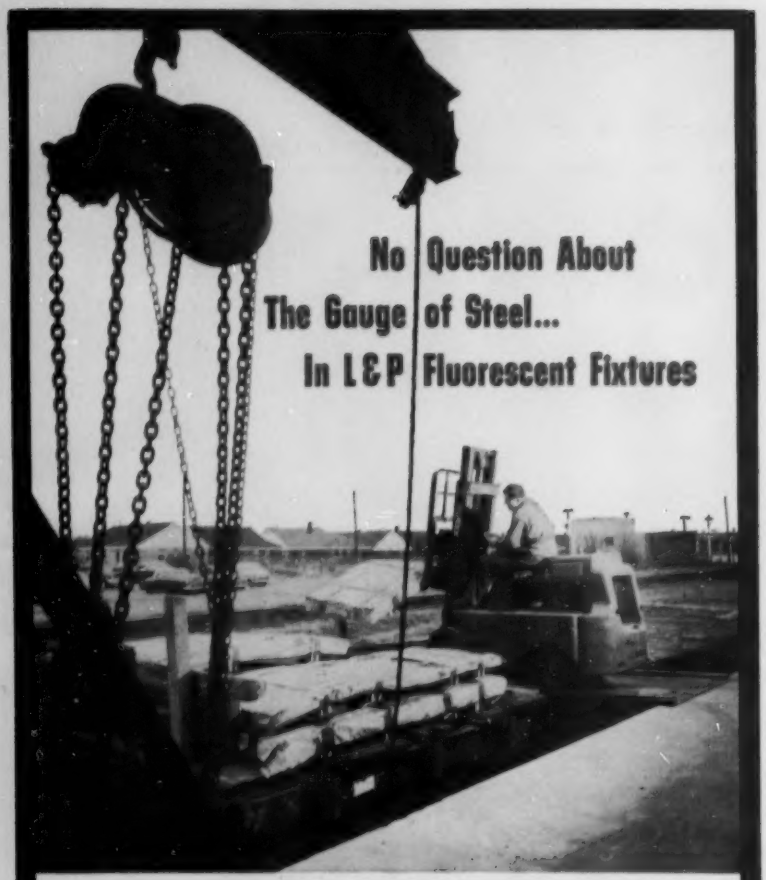

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SERVING THE 18 SOUTHERN AND SOUTHWESTERN STATES

August, 1956 Vol. 36—No. 8

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Economic comment

by J. Whitney Bunting, Ph.D.
Contributing Economics Editor

Dollar cheapness

The latest reports concerning the cost of living, and conversely the value of the dollar, show some alarming indications. The dollar today is worth only 51.5 cents as compared with that of 1939. This means that one has lost nearly half of his purchasing power of his income during the past seventeen year period.

Stated in slightly different terms, a person earning $3,000 in 1939 would have to earn $5,796 in order to purely break even in value of goods and services earned. It is further estimated that this situation may become worse instead of better before the year ends.

There are a variety of indications that such will be the case. Even disregarding current trends, the present steel wage negotiation will mean some added consumer costs. For example, there is relatively little that the consumer can purchase today that does not have some implications of cost, either direct or indirect, that are attributed to steel. Even soft goods that have no steel in their makeup demand machinery and tooling that is dependent upon the supply of steel.

Steel management entered the current negotiations with a wage offer that will inevitably be passed along to the consumer in the form of higher prices. This decision was announced at the outset of negotiations. Labor has other costly wishes, too, that may creep into the final negotiated contract. This in itself will raise general prices.

In general most other consumer cost items are showing a present higher trend. Clothing is about the only item that seems to be holding steady while real estate in some areas has shown a tendency to lower. Food costs tend higher as do most appliance prices. New models of most every type of appliance have higher price tags.

In addition, the tax figure shows a tendency to increase very promptly. Foremost here is the new long range highway program that will add quite a bit of cost to the citizens' tax bill. There is no way to avoid recognition of the fact that by year's end it will cost more to live in these United States.

Economic study

The field of economics, so extremely important in the daily lives of everyone, has long been a rather unpopular area of study. The fact that it has such an important relationship to our personal and national well-being has promoted many new interests by business and industrial leaders. This enthusiasm for corrective action in the teaching of economics has spread to the schools and colleges of the nation. This wave is being furthered by several divergent, yet similarly interesting movements today.

Economics has long been characterized as the "dismal" science. Originally the name arose from the fact that it dealt with scarcity of the factors of production (and thus of finished goods) in correlation to a constantly increasing and seemingly insatiable demand for such goods. This led constantly into conclusions that man's wants and desires would, in the long run, outstrip the means of supply. This has not happened, except in isolated cases, because man's ingenuity and inventive genius has generally stimulated inventions that have increased the per capita rate of production.

The term "dismal," however, has certain modern connotations in the field that pertain primarily to ineffective teaching and an inbred fear of the science as a course of study. Like the case in mathematics and various science courses, students shy away from enrolling in economics work because they feel it to be dry, uninteresting and at the same time fraught with possibilities of academic failure. All of the above can be eliminated to a large extent if the manner and method of teaching employed is such to promote practical interest from the everyday living point of view.

Interest stimulated

Part of the answer lies in the summer Economic Workshops for Teachers, that are now in operation in many college locations. These courses tend to stimulate the basic interest in economic subject matter so that elementary and secondary school teachers may weave some economic data and materials into the classroom procedure. Many of these teachers would never present economics even in its most elementary form if it were not for the contacts they have made through a workshop.

Many teachers have not had any formal contact with economics even during their college careers. Thus they have had a very real fear against offering a subject matter area to their students in which they lacked competence. Fortunately, this problem is diminishing each year although many of our teachers still complete college and receive teacher certification without any contact with the field of economics.

A second fact of importance in the popularizing of economics lies in business attitudes toward this subject matter. A few years ago many businessmen, both large and small, belittled the value of economics in relation to the more practical areas of banking, marketing, salesmanship or accounting. There is still enthusiasm for the business administration courses, yet there is also a growing recognition that the knowledge of economics often underlies a successful business career.

A recent General Electric Company study of college courses deemed most valuable for business career development placed economics a close second to English communication and expression. Surveys among other groups tend

(Continued on page 132)

Dr. Bunting is a well-known economist and educator having special knowledge of the South.

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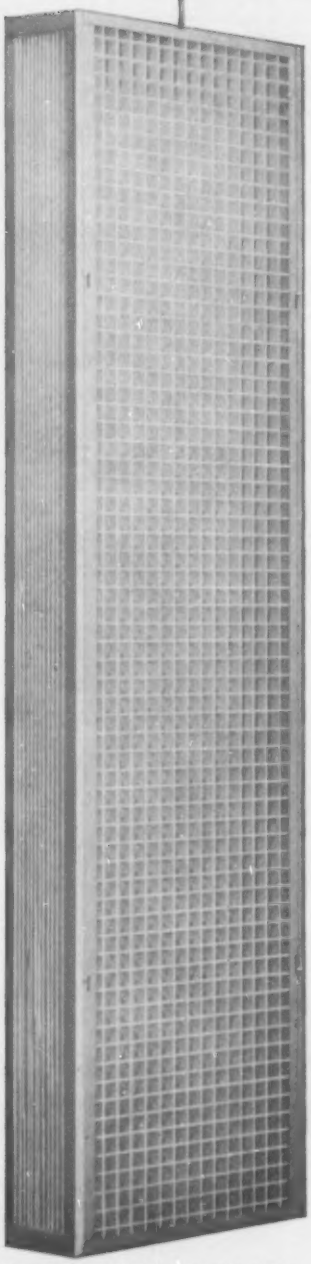

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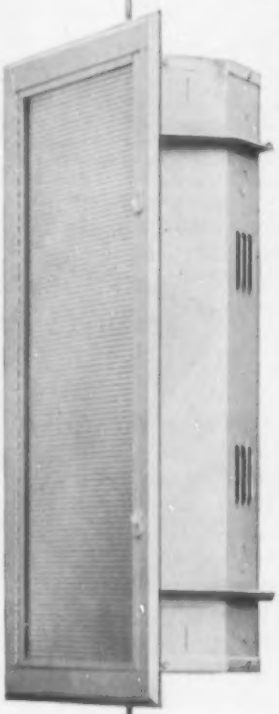

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IAEI, Mississippi Chapter. C. B. Grauer, Secretary-Treasurer, P. O. Box 1790 Jackson, Miss.

IAEI, Missouri-Kansas Chapter. T. McGinnis, Secretary-Treasurer, City Hall, Topeka, Kan.

IAEI, St. Louis Chapter. Nell W. Butteiger, Secretary-Treasurer, 7427 Canton Ave., University City 14, Mo.

IAEI, North Carolina Chapter. C. S. Whitaker, Secretary-Treasurer, City Hall, Durham, N. C.

IAEI, Oklahoma Chapter. T. C. Wier, 1907 W. 41st St., Tulsa, Okla.

IAEI, South Carolina Chapter. N. R. Darling, Secretary-Treasurer, P. O. Box 390, Columbia, S. C.

IAEI, Tennessee Chapter. R. E. Ward, Div. of Fire Prevention, 102 State Office Bldg., Nashville 3, Tenn.

IAEI, Texas Chapter. R. L. Payne, Secretary-Treasurer, 3303 Schley St., Dallas, Tex.

IAEI, Texas Gulf Coast Chapter. M. W. McRaven, Secretary-Treasurer, P. O. Box 1700, Houston 1, Tex.

IAEI, Southern Section. A. M. Miller, Secretary, 910 West 30th St., Richmond 25, Va.

IAEI, Virginia Chapter. A. M. Miller, Secretary, Treasurer, 910 West 30th St., Richmond 25, Va.

IAEI, West Virginia Chapter. H. L. Parks, Secretary-Treasurer, P. O. Box 626, Charleston, W. Va.

MOTOR REPAIR SHOPS

National Industrial Service Association, Inc. Fred B. Wipperman, Executive Secretary, 818 Olive St., St. Louis 1, Mo.

NISA, Southeastern Chapter. M. E. Assalone, Secretary, 235 NW 2nd Ave., Miami 36, Fla.

NISA, Electric Motor Service Association of the District of Columbia. John W. Lainhart, Secretary, 913 E. St., NW, Washington 4, D. C.

NISA, Louisville Chapter. W. C. Krauth, Secretary, 118 S. 1st St. Louisville, Ky.

NISA, New Orleans Chapter. William Dreis, Secretary, 1617 Calliope St., New Orleans, La.

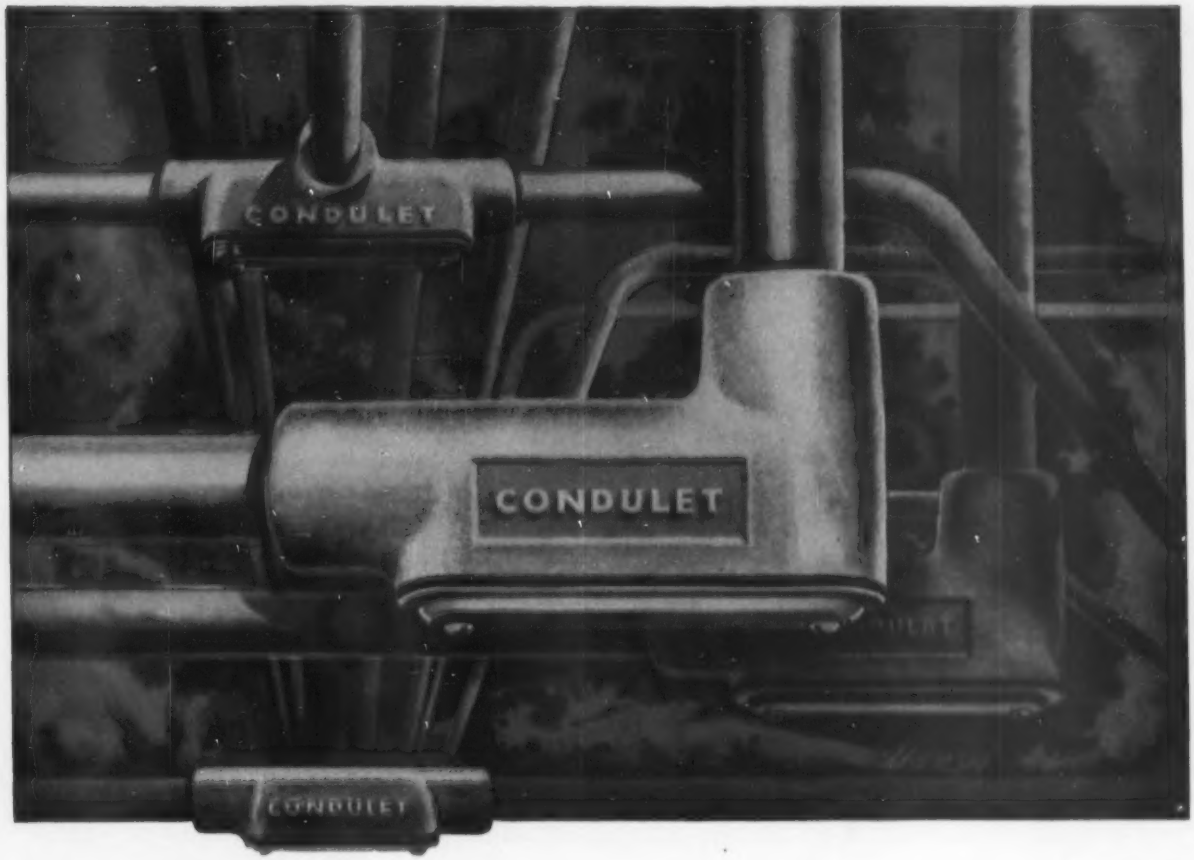
NISA, Mid-South Chapter. Murphy G. Miller, Secretary, 109 Jennings Ave., Knoxville 17, Tenn.

NISA, Southwestern Chapter. George Foshee, Secretary, 203 S. Main, Fort Worth 4, Tex.

NISA, Electric Club of West Virginia. O. E. Jenkins, Secretary c/o Guyan Machine Co., Logan, W. Va.

Nothing Beats

CONDULETS* and RIGID CONDUIT for FLEXIBILITY, SAFETY, ECONOMY



- **INSTALL ANYWHERE.** Crouse-Hinds Condulets and rigid conduit operate safely and efficiently under all atmospheric conditions and in all occupancies.
- **INCREASE CAPACITY EASILY.** You don't have to tear out and replace the entire system: merely pull additional wires or put in a larger size.
- **ASSURES MAXIMUM SAFETY.** Condulets are Taper-Threaded to provide a permanent low resistance path to ground.
- **GREATER DURABILITY.** Condulets and rigid conduit provide circuits with more protection against physical damage than any other wiring system. Further, Condulets are made of galvanized cast Feraloy, and resist corrosion.
- **LOWER OVER-ALL COST.** First cost is the entire cost — a minimum of maintenance is required.

COMPLETE FLEXIBILITY

There's a Condulet to meet every need of complex modern electrical layouts. See your Condulet Catalog.

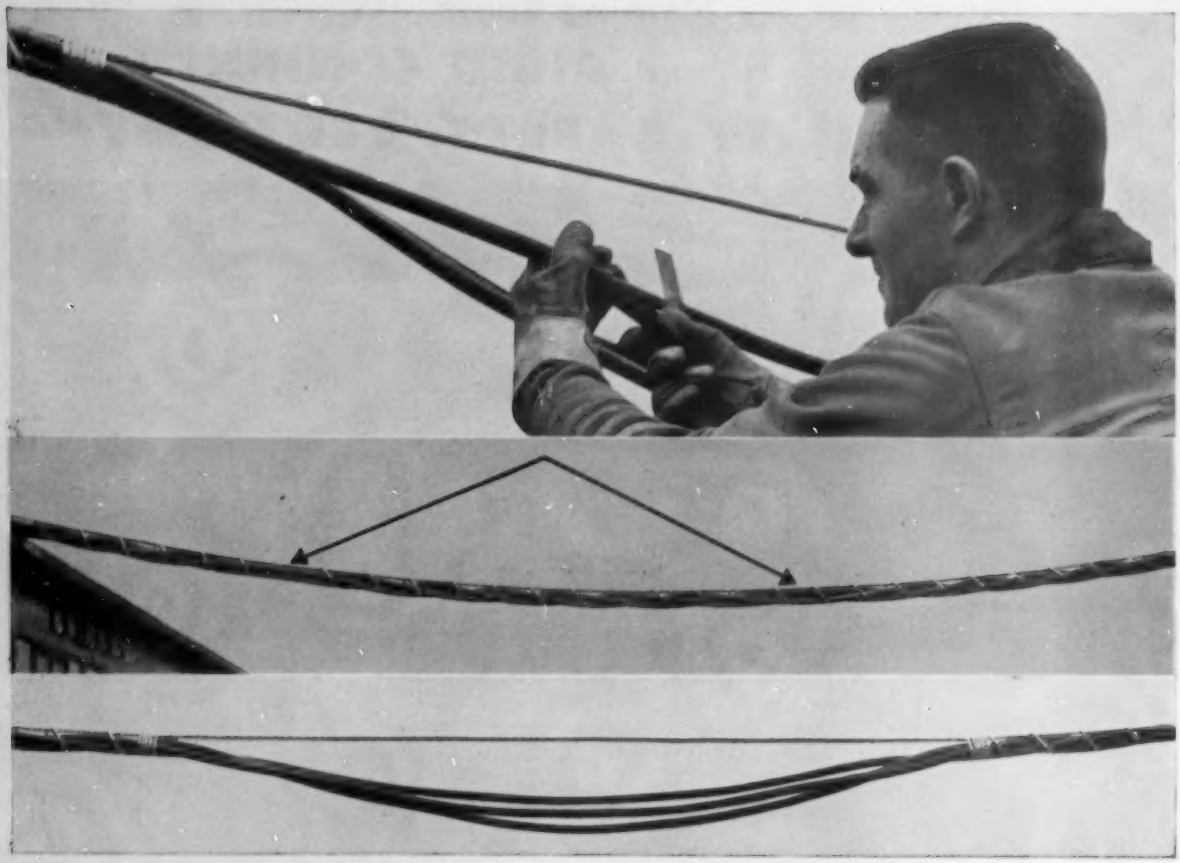
A NATIONWIDE DISTRIBUTION exclusively through ELECTRICAL DISTRIBUTORS

*CONDULET is a coined word registered in the U.S. Patent Office. It designates a product made only by the Crouse-Hinds Company.

CROUSE-HINDS COMPANY

Main Office and Factory: Syracuse, N. Y.
Crouse-Hinds Company of Canada, Ltd.: Toronto, Ont.

OFFICES: Birmingham Boston Buffalo Chicago Cincinnati Cleveland Dallas Denver Detroit Houston Indianapolis Kansas City Los Angeles Milwaukee New Orleans New York Philadelphia Pittsburgh Portland, Ore. St. Louis St. Paul San Francisco Seattle Tulsa Washington RESIDENT REPRESENTATIVES: Albany Atlanta Baltimore Baton Rouge Charlotte Chattanooga Corpus Christi Jacksonville Reading, Pa. Richmond, Va. Shreveport



Count these extras for Rome "Easy-Tap"

1. High resistance to storms, weathering and environmental hazards . . . means long life, lower maintenance cost.
2. Elimination of tension on conductors . . . permits proper tensioning and sag of the messenger.
3. Provides greater reliability of service than open wire circuits . . . increased strength against ice and wind loading.
4. Enables making of mid-span taps . . . relieving congestion at poles and improving appearance.
5. Resistance to tree abrasion . . . minimizes tree trimming expense and eliminates need for overlength poles to clear trees.

Save time—save money with Rome® "Easy-Tap"

preassembled "Reverse-Lay" aerial cable

Now you can get all the advantages of a self-supporting aerial cable with these Rome "Easy-Tap" cost-saving benefits.

- It can be "hot tapped" easily and quickly without cutting conductors.
- The completely assembled cable is simple to install, tap, splice and terminate.
- The distance between reversals is short enough—approximately 5 feet —to permit opening the cable at the pole without use of platform or special equipment.
- Requires less pole hardware.

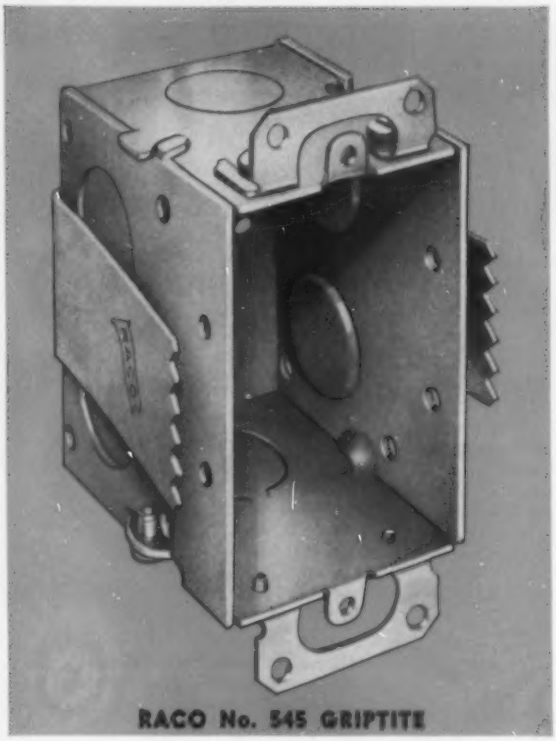
Rome "Easy-Tap" aerial cable is factory assembled and features a "Reverse-Lay" construction. As the name implies, the lay of the power conductors around the supporting messenger is reversed at regular and frequent intervals. This facilitates the making of taps before or after installation while the cable is energized or "hot." The reversed sections provide sufficient slack in the insulated conductors for linemen to make a tap simply by removing the binder tape and untwisting the conductors to be tapped.

Rome "Easy-Tap" is especially suitable for the 5000-volt, unshielded service range and may be manufactured with a RoZone, premium oil base, ozone-resistant insulation and either RoPrene (Neoprene) or Ro-Seal (flame-resistant polyethylene) sheath. Manufactured in sizes through 500,000 CM.

Contact your nearest Rome Cable office or write direct to Engineering Department, Rome Cable Corporation, Rome, New York, for help with your particular application.

It Costs Less to Buy the Best

ROME CABLE Corporation
ROME · NEW YORK
and
TORRANCE · CALIFORNIA



New RACO GRIPTITE BOX

Saves Time and Money On All "Old-Work" Installations

SIX EASY STEPS TO INSTALL

RACO
Outline Wall Opening from Pattern (Pattern is Enclosed in Box)
Cut Wall Opening and Try Box for Size
Back Out Center Screw as Far as Necessary to Clear Wall, Then Connect Cable
Insert Box in Wall Opening
Push Center Screw Back Until Holder Snaps in Place
Tighten Center Screw, Box is Firmly Anchored

- ✓ EASIEST BOX TO SET IN PLACE
- ✓ FOR ANY TYPE OF WALL
- ✓ ONE-SCREW ADJUSTMENT
- ✓ ANCHORS SECURELY

The RACO Griptite Box takes less time to install, is easier to adjust, holds tighter than any other method of "old-work" installation. Made of heavy gauge metal . . . durably finished. Saves time and money . . . helps protect your profit margin on "hard-to-figure" old work installations.

WRITE TODAY FOR COMPLETE INFORMATION

ASE RACO

"A RACO BOX FOR EVERY NEED"

ALL-STEEL EQUIPMENT INC. Aurora, Illinois

CATALOGS and BULLETINS

Available Free to Readers of Electrical South upon Request

1048—Plug-in Strip
An illustrated catalog showing the complete "Plug-in" Strip line has recently been published by National Electric Products Corp., Pittsburgh, Pa. This eight-page illustrated brochure pictures the three and six foot standard lengths of the multi-outlet branch circuit assembly.

1086—Cable Connectors
Tomic Sales and Engineering Co., 4864 Woodward Ave., Detroit 1, Mich., now have available catalog sheets containing data on the complete line of their connectors, couplings, and cable connectors.

1088—Fittings and Fixtures
A 32-page illustrated catalog covering Killark fittings and fixtures is offered by Killark Electric Mfg. Co., Vandeventer and Easton Aves., St. Louis 13, Mo.

1092—Electrical Boxes
Steel City Electric Co., 1207 Columbus Ave., Pittsburgh 12, Pa., offers a catalog of their complete line.

1130—Conduit Fittings
The latest completely illustrative catalog on their diversified line of conduit fittings is announced by the Atlantic Conduit Fittings Co., 589 Atlantic Ave., Boston 10, Mass.

1136—Space Heating Guide
Cavalier Corp., Chattanooga 2, Tenn., has prepared a Guide for Calculations on Electric Space Heating. It is based on study of several thousand installations of electric heat and is a handy reference for calculating electric heating requirements and estimating operating costs. The booklet contains discussion, charts, and floor plan examples.

1150—Fluorescent Fixtures
Light & Power Utilities Corp., 1035 Firestone Blvd., Memphis, Tenn., has printed a new catalog of fluorescent lighting fixtures. The new catalog is divided into six sections, each printed in its own distinctive colors. First section is devoted to "General Data" and details to L&P manufacturing.

1166—Electrical Fittings
A 40-page illustrated catalog and price list on the Gedney line. Shown and listed are conduit, threaded entrance, SEC, EMT and ground fittings, and box connectors for both armored and non-metallic cables. Copies are available from Gedney Electric Co., RKO Bldg., Radio City, New York 20, N. Y.

1184—Approved RHW Wire
Bulletin No. 1018 describing first Underwriters' Approved Type RHW Wire, developed to meet the new National Electrical Code standards, is available from Simplex Wire and Cable Co., 79 Sidney St., Cambridge 39, Mass.

1190—Electrical Fittings
Blackhawk Industries, Dubuque, Iowa, offers a complete catalog of electrical conduit and cable fittings. Also, a special publication giving detail drawings and instructions for installing service entrance masts on low or ranch type buildings.

1192—Wire Pulling Lubricant
Illustrated six-page folder showing the advantages of an improved Y-Er Eas wire pulling lubricant is available from Electro Compound Co., 3812 150th St., Cleveland 11, Ohio.

1214—General Catalog
General catalog of Royal Electric Co., Inc., Pawtucket, R. I., covering flexible service and lamp cords, cord sets, extensions, trouble lights, wiring devices and decorative Christmas lighting is available to wholesalers. Dealer catalogs may be secured from Royal distributors.

1218—Carbon Products
A 28-page catalog on Motor and Generator Brushes and carbon products telling how to order brushes grade recommendations characteristics and description of brush grades is available from the Helwig Co., 2536 North 30th St., Milwaukee, Wis.

1220—Stadium Lighting
The Pyle-National Co., 1334 N. Kostner Ave., Chicago, Ill., announces the availability of a new eight-page bulletin, No. 605, on stadium lighting, describing in detail floodlighting of a typical outdoor athletic arena stressing the importance of using fully enclosed floodlights.

1224—Electrical Equipment
The Wadsworth Electric Mfg. Co., Inc., Covington, Ky., has issued a new catalog Con 15-0 and Bulletin W. C. B. 53-1, containing data on their lines of Safety Switches, Service Equipment, Distribution Panels and "E-Z-RED" Circuit Breakers.

ELECTRICAL SOUTH
806 Peachtree St., NE **August, 1956**
Atlanta 8, Ga.

Gentlemen:

Please send me the bulletins and catalogs indicated.
(Print Plainly)

Name _____ **Title** _____

Company _____

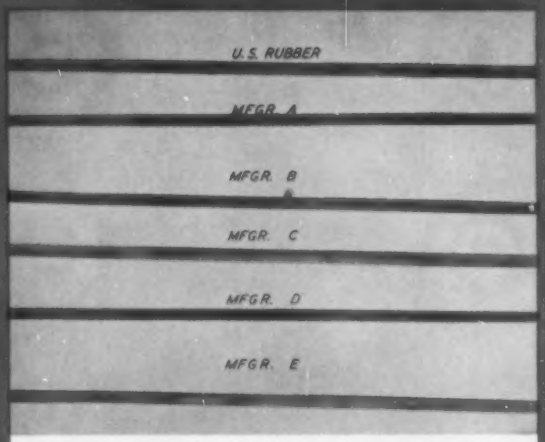
Address _____

City & State _____

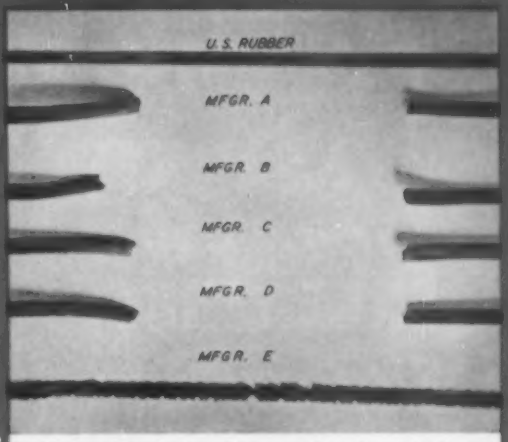
Circle numbers below. Bulletins and catalogs will be mailed promptly.

1048	1086	1088	1092	1130
1136	1150	1166	1184	1190
1192	1214	1218	1220	1224
1230	1238	1240	1242	1244
1248	1250	1254	1260	1262
1264	1266	1268	1270	1274
1276	1278	1280	1282	1284
1286	1288			

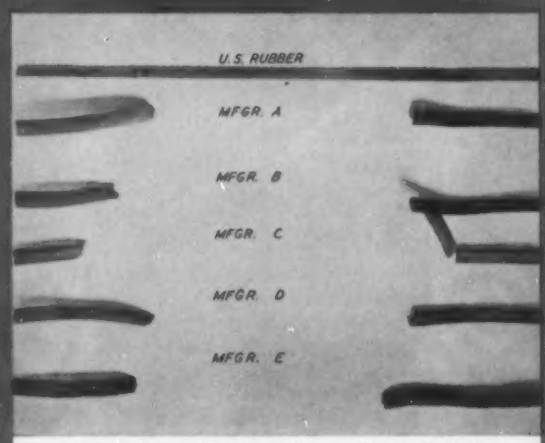
Grizzly High Voltage Power Cables



Here are 6 samples of widely used competitive neoprene jackets (stretched 200% of original length) at start of test for ozone resistance.



2 hours, 23 minutes after start. Brand "E" is disintegrating. Brand "B" has failed 13 minutes ago; the other brands failed an hour or more before.



Taken 7 hours after start of test—Brand "E" failed after 2 hours, 30 minutes. U. S. Grizzly Power Cable's jacket showed practically no sign of damage. It did not fail until after 18 hours of exposure.

Proved far and away the winner in an Ozone test of 6 leading competitive jackets!

U. S. Grizzly® High Voltage Power Cables are unmatched in performance, durability and all-around economy. Order these superior cables from your "U. S." branch, distributor or write Electrical Wire & Cable Department, United States Rubber Company, Rockefeller Center, New York 20, N. Y.

Obsolete wiring can cause power failure, step up expense and push down your production. That's why it's important to make sure your plant is equipped with Adequate Wiring—adequate not only for today's needs but also for the increased electrical loads needed in your future growth.

Electrical Wire & Cable Department

United States Rubber

Prevent "False-Alarm" fuse-blowing . . .

with KEARNEY *Specialized* FUSE LINKS

To reduce annoying outages to an absolute minimum . . . without sacrificing safety . . . you need more than just "fast" and "slow" fuse links. These KEARNEY fuse links have special matched time-current characteristics to meet the specific needs of each circuit:

TYPE KS . . . specially developed to protect and yet keep outages to a minimum on circuits subject to switching and lightning surges . . . can carry overloads up to 150% indefinitely without damage to fuse link or cutout.

TYPE X . . . specially developed to keep transformers in service during overloads and surges . . . yet always interrupting current before the damage range of the transformer is reached. Opens 230% of rated load within five minutes.

ALSO . . . *Type K—the EEI-NEMA standard fast fuse link . . . and Type T—the EEI-NEMA standard slow fuse link.*

JAMES R. KEARNEY CORPORATION • 4224-42 Clayton Ave., St. Louis 10, Mo. • *Canadian Plant:* Guelph, Ontario

for BETTER CONSTRUCTION
SAFER MAINTENANCE

Specify KEARNEY PRODUCTS

JAMES R. KEARNEY

The Mark of Quality

1230—Compression Connectors

An illustrated 18-page bulletin (13A) describes Squeezon compression connectors for all overhead distribution connections from line wire to ground rod. Offered by James R. Kearney Corp., 4236 Clayton Ave., St. Louis 10, Mo., the bulletin also describes the mechanical and hydraulic installation tools required and tells where to use each.

1238—Selecting Fuses

A 12-page descriptive handbook "Fuseology" tells how to get safest, most dependable, trouble-free electrical protection from fuses. Contains useful information on selecting right size and type of fuses—how to stop needless blows—avoiding poor contact and other troubles. Issued by Bussmann Mfg. Co., University at Jefferson, St. Louis 7, Mo.

1240—Lighting Fixtures

Prescolite Manufacturing Corp., 2229 Fourth St., Berkeley 10, Calif., now has available a 20 page color catalog, No. 31-F, describing their complete line of lighting fixtures including recessed series and accessories, surface series and accessories, exit lights, and aisle lights. A typical installation and dimensional drawing are shown for each fixture.

1242—Distinctive Lighting Fixtures for the Home

Jay Lighting Manufacturing Company, Inc., 25 Quincy Street, Brooklyn 38, New York has available upon request a new six-page illustrated supplement featuring their fixtures for the home.

1244—New Electrical Fittings Catalog

Concise 36-page catalog illustrates and describes a complete line of electrical fittings, cable racks and wiring specialties. The catalog contains many detail drawings, clear-cut photographic illustrations of mast fittings, cable connectors, straps, hangers and ground clamps in a wide variety of types and sizes. For your free copy, write The M. & W. Electric Mfg. Co., East Palestine, Ohio.

1248—Conductor Armor

A new catalog of Superformed Armor Rods, Lineguards, Patch Rods, and Tap Armor describing various uses and applications of these products on overhead conductors is offered by The Fanner Manufacturing Company, Brookside Park, Cleveland 9, Ohio.

1250—Electrical Enclosures

Catalog No. 5354 currently being offered to the trade by B & C Metal Stamping Co., 590 Means St., N. W., Atlanta, Ga., is a well-organized, 66-page manual giving complete descriptive information, prices, and specifications on all items in the B & C line of electrical enclosures. Copies are available free of charge to electrical contractors.

1254—Construction Anchors

"Anchoring for Power and Communication Lines," a completely illustrated manual on improving line construction with better anchoring, has been published by the Advertising Dept., the A. B. Chance Co., Centralia, Mo. The 25-page booklet shows how to install the right anchor at the right place in the right way.

1260—Lampholders

Multi Electric Manufacturing, Inc., 4223-43 W. Lake St., Chicago 24, Ill., has available copies of their Bulletin No. 555, which illustrates and describes the complete line of Multi Sparlites and accessories and fittings for these lampholders. Combination units are included.

1262—Fluorescent Fixtures

The new loose-leaf catalog recently issued by Southern Lighting Manufacturing Co., 501 Elwell St., Orlando, Fla., contains complete diagrams, specifications, and descriptions for all fluorescent fixtures which they manufacture. In addition to the information on commercial, industrial, and school fixtures, the catalog also lists hangers, troffers, troffer accessories, and incandescents which are available from the firm.

1264—Thiel Fasteners

Literature is now available on Thiel Easy Drive staples and other fasteners such as Hump Drive "Nail-Its," "Grip Type" 1-hole pipe straps, hangers, etc. Write to Thiel Tool and Engineering Co., 1417 N. Market St., St. Louis 6, Mo.

1266—Metal-Clad Switchgear

Detailed information on metal-clad switchgear is now available in two special bulletins, 7004-B and 7004-C. These booklets give descriptions, application data and specifications on units up to 15 kv and 500,000 kva interrupting capacity. Wire I-T-E Circuit Breaker Co., 19th and Hamilton St., Philadelphia 30, Pa.

1268—Lighting Fixtures

The Perfeclite Co., 1457 East 40th Street, Cleveland 3, Ohio, makes available the following literature: (1) Data Folder 54-B—4 pages of engineering information, prices and specifications on Plastic Indirect Concentric Ring Luminaires. (2) Data Folder EX-55-A—10 pages of information on Exit Units for all building locations. Complete engineering data and prices given. (3) Data Folder 56-A—information including prices and specifications on Ceiling Pan Fixtures and Vapor Proof Prismatic Exterior Fixtures.

1270—Aerial Ladders

J. H. Holan Corp., 4100 W. 150th St., Cleveland 11, Ohio, has just published a 4-page catalog on their Series 2200, Mechanical Ladder. They also have a new catalog on their Series 2100 All-Hydraulic Ladder.

1274—Space Heaters

A bulletin has been released by Ceilheat, Inc., 5215 Homberg Dr., Knoxville, Tenn., describing their line of wall unit space heaters, with specifications. Ceilheat's three types of radiant cable are also described.

1276—Attic Fans

A new four-page, two-color catalog (Bulletin 7514) describing the new Model CA Ventura attic fans for residential "comfort cooling" is now available from American Blower Corp., Detroit 32, Mich.

1278—Porcelain Insulators & Hi-Line Hardware

Knox Porcelain Corp., Knoxville 1, Tenn. has recently released catalogs containing complete information on their suspension, pin-type, spool and guy strain insulators as well as Hi-Line hardware and bushings.

1280—Electric Heating

Electromode Division of Commercial Controls Corp., 45 Crouch St., Rochester, N. Y., has issued a new catalog listing their complete line of electric heaters, including bathroom, wall-type, portable, baseboard heating, radiant heating panels, various industrial units, and combinations. Also included in Catalog No. 31-K-3 are complete specifications and price list.

1282—Exit Lights

A four-page catalog providing illustrations and specifications for their complete line of exit lights has been released by Curtis Lighting Co., 6135 W. 65th St., Chicago 38, Ill. Types of mountings illustrated include recessed, end to wall, ceiling, direct wall, and pendant.

1284—Electric Radiant Heating

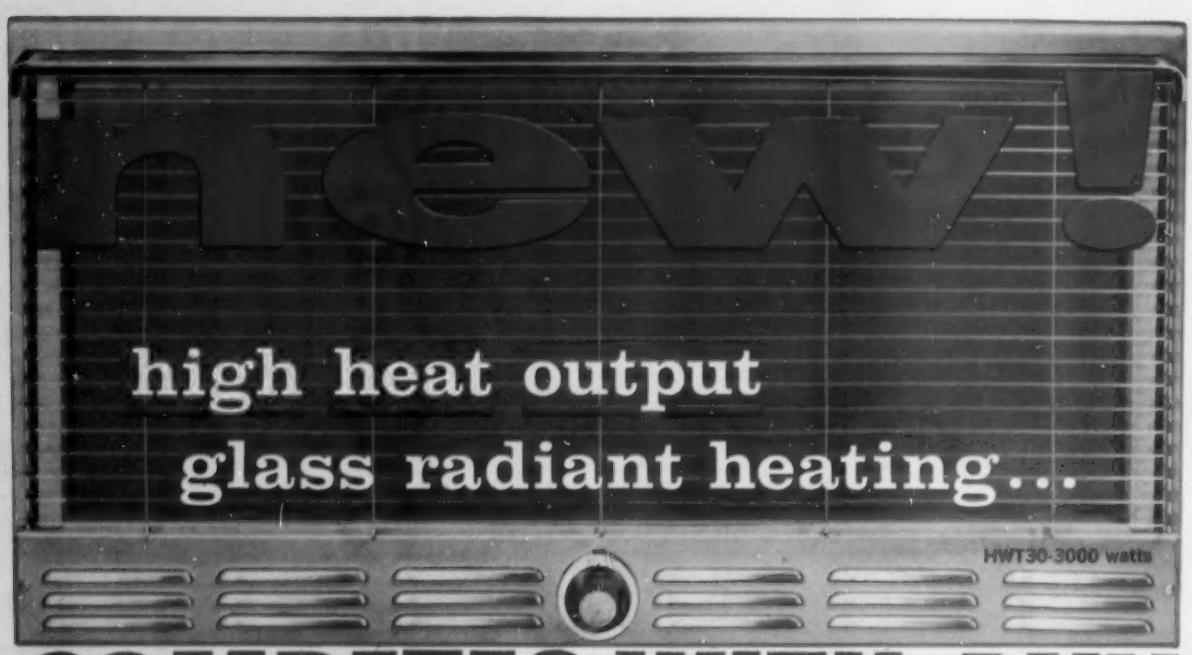
The design and installation of electric radiant heating is covered comprehensively in two publications just released by General Electric Co., 95 Hathaway St., Providence 7, R. I. Designers of heating systems will find valuable information in a 24-page Electric Radiant Heating Design Manual. A 36-page manual explains and illustrates how to install G-E Electric Radiant Heating in homes.

1286—Lighting Fixtures

A six-page catalog, A-7, giving ordering information and illustrated instructions on installation of their line of electrical fixtures is available from Ainsworth Lighting Inc., 38-10 29th St., Long Island City 1, N.Y. Candlepower distribution and brightness reports from official testing laboratories are included.

1288—Electric Ventilators

An illustrative 8-page folder, Bulletin 620-L, showing typical installations of a complete line of ventilators for wall, ceiling, laundry, bathroom, kitchen, and small rooms, is available from Trade-Wind Motorfans, Inc., 7755 Paramount Blvd., Rivera, Calif. The folder includes dimensional drawings of installations helpful to building and electrical contractors.



COMPETES WITH ANY LOW COST HEATING!

New Berko units bring huge expansion in market for supplementary heating...makes whole house heating economical...profitable!

For the first time, the finest quality glass electric radiant heating can compete in cost with *all* other heating systems! Only Berko has developed the new units that make this possible. Because these new units have much higher heat output, fewer units are required. As a result, the cost and time of installation is cut to a bare minimum.

With this new series, glass radiant heating becomes the logical choice in hundreds of places: motels, milk houses, pump houses, cold areas in stores, garages, warehouses, and many other hard-to-heat places.

Safer...More Compact...More Attractive!

- No glowing coils or elements... safe for children
- Compactly designed to save space
- More easily installed... knock-outs on back and on bottom, for easy cable or conduit entrance
- Built-in double deflectors
- All units available with built-in thermostat

We have put all our promotional effort behind these new units...national advertising and local newspaper campaigns ...we believe they'll revolutionize the heating industry!

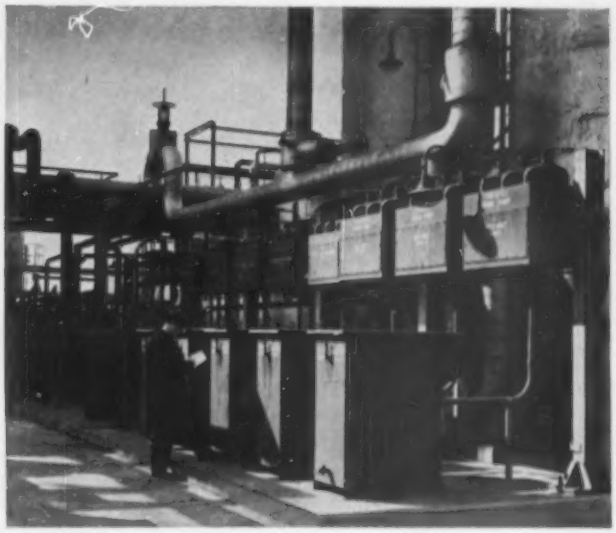
BERKO

FOR FURTHER DETAILS on this great new development... write, wire, or phone your wholesale electrical distributor or:

ELECTRIC MANUFACTURING CORP.
212-40 Jamaica Ave., Queens Village 28, N. Y. HOllis 5-1047

NEMA UL

COMPLETE LINE of G-E oil-filled cutouts includes pole, pothead and subway types and metal-enclosed assemblies.



INDUSTRIALS, such as this oil refinery, use these three-phase metal-enclosed G-E oil-filled cutout assemblies to protect equipment.

UTILITIES with underground systems use G-E oil-filled subway-type cutouts for single phase or three phase, gang-operated, fusing or switching. Expansion chambers are required to secure full interrupting rating.

For best in low-cost switching...industrials, electric utilities choose G-E oil-filled cutouts

Indoors or outdoors, they permit substantial savings on first cost and fuse replacement—combine high interrupting capacity, safer operation and long life

For utility, industrial, commercial and institutional applications that combine overcurrent protection and load-break switching, more and more companies are choosing General Electric oil filled cutouts.

HERE'S WHY: Low-cost G-E oil-filled cutouts provide high interrupting capacity . . . up to 11,000 rms amperes. They provide for maximum safety of personnel . . . all arcing occurs under oil and all flame, noise and electrically live parts are confined within a metal housing. And G-E oil-filled cutouts offer long service life since interrupting ratings are based on test conditions far more severe than those normally encountered in operation.

IDEAL INDOORS OR OUTDOORS G-E oil-filled cutouts are quiet in operation, and they may be wall or direct-to-equipment mounted. Single- or three-phase metal-enclosed assemblies provide for all wiring and electrical connections to be completely enclosed in a grounded steel cabinet. Entrances can be provided for connection to outgoing cables.

Other G-E oil-filled cutout features include:

- Simple fusing, even on gang-operated assemblies. Preformed fuse links easily slip into place.
- Silver-plated self-aligning contacts of heavy forged copper with special arcing tips . . . minimize wear.
- Leads brought into cutout housing above oil level—no gasketed joints under oil pressure.
- Pole and pothead types do not require expansion chamber for full interrupting capacity.

If you have an application that requires overcurrent protection *plus* load-break switching, it will pay you to investigate G-E oil-filled cutouts. Available for 2400-, 4330- and 7200-volt circuits, they can mean substantial savings in initial costs and fuse replacements.

For complete information, contact your nearest G-E Apparatus Sales Representative, or write for bulletin GEC-863, General Electric Company, Schenectady 5, N. Y. 403-12

Progress Is Our Most Important Product

GENERAL ELECTRIC

B. M. Davis, general sales manager, and Al Hardin, promotion manager, discuss preliminary phases of MP&L's electric heating educational program. At right, Charles Sherrod, G-E field engineer, conducts a dealer school at Capitol Installation Co., Jackson, stressing heat pump merchandising.

Increased utility promotion

Utilities and dealers in Mississippi are embarking on a concentrated promotional campaign to sell electrical heating in this area where low-cost natural gas is the predominant heating fuel. Much depends, they say, on a reduction in power rates for the area.

◆ LIKE A SLEEPING GIANT electric heating for homes and commercial buildings is beginning to flex its muscles in the Jackson, Miss. area. The flexing is just a mild twitch so far, but efforts by the local utility, Mississippi Power & Light Co., a few electrical supply distributors, contractors, and home builders may change things very shortly.

Spurred by demands, differing for economic reasons by firms in each category, there is a realization forming that electric heating is coming of age and is here to stay. However, all involved realize that the future impetus of electrical heating here, depends upon its acceptance by a public, so far apathetic.

However, as one electrical supply distributor puts it, the public cannot be blamed too much for its apathy, because electrical heating promotion so far in this part of the country has been practically non-existent.

In July, 1953, MP&L started a training program for all sales personnel that included the qualifications necessary to design and sell electric heating in homes and commercial buildings. This was a ten-month program which included written and oral assignments for one-half day every three weeks.

Educational campaign

Now, in order to correct a slowdown in electrical heat promotion for the past two years, MP&L is planning a powerful electric heating educational campaign to consumers, electrical contractors, home builders and distributors and dealers, that should be well underway this fall.

Increased efforts by the entire sales and promotional staff of the utility to sell electric heat ideas, is under the leadership of L. O. Bradshaw, manager of marketing and development department, and B. M. Davis, general sales manager. Although planned as a public service, for which this utility is noted, the program is expected to help fill the valley of about 70,000 kw now available during the winter season.

In addition to a strong newspaper advertising campaign throughout its service area, other features of MP&L promotional planning will include:

(1) A kick-off dinner meeting at a Jackson hotel where all types of heat pumps will be demonstrated and explained to invited electrical contractors, speculative home builders, architects and distributors.

(2) The preparation and distribution of data and other information on all types of electrical heating, to consumers, builders, electrical contractors and others interested.

(3) A traveling heat pump demonstration (now underway) to all 42 MP&L serviced counties in the state.

(4) Participation by MP&L in the cost of newspaper advertising in promoting the sale of new housing units by speculative builders. For example: A 45 per cent equivalent of the advertising space reserved

Detlef Schwanke, left, sales engr., and employees of Capitol Installation Co., install 5-ton heat pump with two 60-amp disconnect switches, one for 5-ton compressor and one for 13 kw supplementary resistance heating. At right, Woodrow Benton, MP&L home lighting supv., points to wiring serving the unit.

planned for heating

by builder or contractor, provided that housing units are all-e'ectric and in addition contain an all electric heating system such as a heat pump or resistance type heating unit.

(5) Speculative home builders in the major population areas served by MP&L will be assisted in the installation of heat pumps in their model homes.

A run-down on electric heat installations in the Jackson area discloses that a few home builders are awakening to the possibilities of installing electric heating as a sales point in attracting new-home buyers in this area, where new-home buying has been curtailed somewhat by financing problems. Several installations of all electric heat pump units are now underway, or are planned for future jobs.

All-electric house

One job now underway by home-builder E. J. Williams, in East Park 2 subdivision, features a G-E Weathertron, 5-ton all electric heat pump. This 2700 sq. ft. all-electric house sold quickly for $29,000 soon after construction began. Those interested say the all electric heat feature had much to do with closing the sale. This heat pump has a 5-ton compressor unit, and a 13 kw supplementary heat unit. A Certified Adequate Wiring job throughout, with all-electric kitchen and laundry, the wiring job installed by Fred Norton Electric Co., features 100-amp entrance capacity for house service, and two 60-amp feeders for the heat pump and resistance units.

The heat pump supplier for the Williams house is the Capitol Installation Co., a subsidiary of the Capitol Plumbing Co., Jackson. Capitol Plumbing Company is owned and managed by J. E. Stevens.

Sparked by Detlef Schwanke, sales engineer for Capitol Installation Co., distributors for G-E heat pumps in 42 counties, the firm is having some success with merchandising electric heating in commercial as well as residential installations. At present about 75 heat pumps have been installed in the area served by the company.

Working in close cooperation with Capitol Installation Co., is Charles Sherrod, General Electric field engineer for this area, who works only with the sales and promotion of heat pumps for his company. For instance, Mr. Sherrod is conducting dealer schools at Capitol's plant on Gallatin Street in Jackson. It is planned to hold about three of these heat pump dealer schools each year, where dealers are indoctrinated with sales and technical know-how in heat pump merchandising.

Commercial heat pump

A commercial heat pump installation by Capitol Installation Co., in an office-store building in North Jackson features an unusual treatment. Planned as an 8-story building the basement and first floor have been completed and occupied. The remainder of the building will be constructed in the near future, according to the owners.

The first floor is cooled and heated by three 5-ton G-E Weathertron heat pumps located along one wall in the basement. As the basement will also be occupied by offices, two more 5-ton units will be installed there immediately. As the floors above are added, it is planned to add the same units as needed. After several months heating and cooling experience with

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Electric heating makes

Rural homes and homes in small communities are leading the way in Arkansas' acceptance of electric heating as not-too-costly for the average small home owner. Local utility companies are actively engaged in promoting electric heat in the areas they serve.

◆ ELECTRIC HEATING in Arkansas is beyond the experimental stage for both contractor and user. Having been examined, weighed, and proved to be a not-too-costly addition to good living, it is being accepted so fast in some areas of the state that facts and figures seem surprising.

A survey of the central part of the state, taking in some of the more prosperous agricultural territory, indicates that electrical heating is going faster into rural homes and homes in smaller communities than in the larger cities.

Both the heat pump and the radiant type have been accepted by many of the younger and more prosperous builders of new homes. Yet both of these also are going into small homes whose owners are in moderate income brackets.

Tom A. Edwards, manager of the Adequate Wiring Bureau at Little Rock, predicts that ceiling or radiant heating will make headway in several parts of the state.

"A few builders are doing it the wrong way," he said. "They're trying it out in just one or two rooms. To be efficient, electric strip heating should be installed in the entire house. It does not cost much to install, and is well within the income of the average small home owner."

Separate meter reading

He related that one builder, in Jackson County, had installed a three-ton heat pump, with auxiliary strip heating in several rooms. A separate meter on the unit showed that, month by month, heat-pump power consumption ran from 2260 kwhr in February, the coldest month, to 300 in May.

The heat pump, starting as a novelty that was often promoted in all-electric homes opened for public inspection, is still promoted in this way, but many units are going into homes without fanfare. Commercial use of the heat pump is also increasing fast.

A typical owner of a heat-pump house lives at Scott, a plantation town near Little Rock. This young planter's nine-room home, built six months ago, is equipped with a 7½ ton heat pump, suggested by the architect.

"I rather wish now," said the owner, "that two smaller units had been installed instead of one large one. We don't use all the rooms all the time. My friends planning on building large country homes probably will profit from my experience. They'll want a heat pump, after learning about the comfort we enjoy. And some of them will have two small ones."

One of the most interesting heat pump homes is in Newport. This was the city's first all-electric home, and was opened for display. Approximately 5,000 people came to see how a smaller, average-size home, with only 1,100 square feet of living area, could become a luxury home, with electricity furnishing all heat and power. The three-ton heat pump, and even the ducts, were under inspection by the visitors, with a representative of the air-conditioning firm that installed it on hand to tell the heat pump story. Long after opening day, many more people asked permission to inspect the house.

This home was the first in the Newport area to be certified by the Arkansas Adequate Wiring Bureau.

The Arkansas Power & Light Company is now planning another electrical living home for display during the Parade of Homes in September. This is the Electric-Living Home For Young Homemakers, nationally sponsored by a magazine, and built in Little Rock by K. E. N. Cole. This home will have a heat pump.

One of the most stimulating stories concerning electrical heating comes from an REA area.

An interested group listens intently while H. G. Yordy, Cook & Nichol Air Conditioning and Heating, Inc., explains the heat pump ducts in the all-electric model home on display in Newport, Ark.

fast gains in Arkansas

Lewis Lemons, farm electrification advisor of the 1st Electrical Cooperative Corp., Jacksonville, Ark., is doing outstanding work in aiding electrical contractors of his area to promote radiant heating.

The first house equipped with radiant heat was built in the central part of the state, served by this utility company, just one year ago. To date, ten houses have been equipped, and another ten will be completed by the fall of 1956.

"Contractors are still a little afraid of radiant heating," Mr. Lemons said. "It is still so new that the electrical contractor is not sure of his skill. That puts it up to the utility company to pitch in and help constructively."

Mr. Lemons starts at the beginning of a construction job to promote this economical electrical heat. Whenever he can, he contacts the general contractor or the architect and presents figures to show that the average home of 1,000 square feet in this area can be equipped with radiant heating for about $300.

Sometimes the first he knows about a new building is when he is called to furnish temporary electrical service. Then he tries to sell radiant heating by seeing the contractor and the owner.

Proper insulation first

When the electrical contractor is hesitant, Mr. Lemons offers his aid. He first induces the general contractor to provide the right kind of insulation, so that the differential between ceiling and floor temperatures is not more than three degrees. He supervises the imbedding of the wires in the ceiling, working with the electrician as supervisor, and figuring each step, if necessary. He computes the heat loss before installing wiring for the amount of heat each room requires.

After the job has progressed, he checks and rechecks. He tests for breaks in the complete circuit before plastering is completed.

Mr. Lemons is conducting a promotional campaign for electrical heating among the linemen who work for his company.

"It's all a matter of education," he said. "A lineman who knows how radiant heat operates turns into a good salesman. Our linemen are so thoroughly sold on electric heating that they want it in their own homes now."

He insists that when electricians, especially those in rural areas, become thoroughly familiar with radiant heating, this type of electrical heating will become as common as the telephone or the electric refrigerator.

Typical among utility companies in the state that are actively engaged in promoting electrical heat in the areas they serve is the City Water & Light Co., at Jonesboro. The impetus here, according to Neal B. Thayer, manager, is the home owner who has seen electrical heat in use or has read about it.

"There is considerable interest in heat pumps among those who can afford such an installation," he said. "The contractors are hesitant because they are not confident of success."

More electrical heating in his

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Lewis Lemons, right, farm electrification advisor of an REA utility company, tests a radiant heat wiring job while the electrician looks on.

This small home with only 1,100 sq. ft. of living area, heated with a three-ton heat pump, drew 5,000 people when it was opened for inspection.

Lower heating rates sought

With fixed rates of 1¼c kwhr, the goal sought by several Kansas and Missouri utility companies, electric heating sales are expected to rise sharply in this area. Electric heating is seen as the means of restoring the load level disrupted by air conditioning.

◆ WITH THE GROUNDWORK already laid, electric heating is on the verge of launching a full-fledged invasion in the Kansas City, Mo., area awaiting only establishment of electric heating rates by the Kansas City Power & Light Co. Predictions are electric heating sales will start moving into high gear in the late fall of this year when the utility should have its rates fixed.

In the outlying territory of Topeka, Kan., where the Kansas Gas & Electric Company operates on 1½¢ kwhr heating rate and has submitted a request to the Utility Commission for 1¼¢ rates, electric heating has already made healthy progress.

Neighboring Kansas City on the north, in the territory covered by the St. Joseph Power & Light Co., St. Joseph, Mo., there are fifty-three homes heated by electricity on 1¾¢ kwhr rates. In Joplin, Mo., the rate is also 1¾¢ with the utility currently applying for 1¼¢ hourly rate.

In Greater Kansas City, Mo., there are four homes equipped with a combination air-conditioning-heating unit. Two of these have been undergoing painstaking tests by Power & Light engineers. One of these homes, the Kansas City Power & Light Company's all-electric home was the subject of a variety of tests last winter, a good winter for the experiments since the weather, though not unduly rugged, was marked by wide variations of temperatures.

The installation at the Power & Light model home is the heat pump type, which, local experts believe, is the most efficient unit for heating homes electrically in an area where the temperature may drop from 75 degrees to thirty degrees and on down to zero within a matter of hours. For low temperatures, heating experts point out, there should be an auxiliary heat supply that comes on automatically. Resistance heating in addition to the heat generated by a compressor is the answer, the experts say.

Type of insulation

Of conventional frame construction with brick veneer, the K.C. Power & Light all-electric home consists of five rooms including two bedrooms, an activity room, one and one-half baths, dining room and kitchen. The house is insulated in the walls with 3-5/8 inch batt, has two-inch rigid insulation in the foundation and crawl space and a layer of foam glass in the floors. The ceiling has six inches of insulation.

The heat pump is the 5-ton General Electric YR system with 14 kw of resistance heat. One of the unique features of the installation is the Germ Kill lamp located in one of the return air ducts. The heat pump is located in the garage.

Completed in the spring of 1954, the utility engineers have been collecting data on the operation of the heat pump for more than a year. The only piece of auxiliary equipment in this home is a 1,320 watt heater in the bathroom. The installation features a fan with an on-off switch. This equipment is optional with the unit.

There are no dollars and cents figures to release on the bill for heating and cooling this home because the utility hasn't got its rates established. Also, as Leon Boyce, an engineer with K.C. Power & Light, pointed out, it is difficult to separate heating and cooling costs with a single electric-powered unit. However, on the basis of figuring eight months for heating and four months for cooling the home (cooling months were June, July, August and September), the engineers estimate that

C. W. Schumacher, president of Air Contractors, Inc., heat pump specialists in the Kansas City area, holds an cut-of-town newspaper clipping offering a 40% reduction in electric rates from November through March to owners of all-electric heat pumps.

in Kansas

it required 10,667 kwhr to heat the all-electric home and 4,611 kwhr to cool it.

Surprisingly enough to the utility engineers, the kwhr consumption in the spring and fall was considerably higher than anticipated, and the results demonstrate that this type installation will provide a better year-around load for the utility.

Testing equipment

Equipment used in testing the home includes a temperature and pressure recorder for recording both indoor and outdoor temperatures, and the suction and discharge pressure of the compressor. The resistance heat was metered separately in order to test the load potential as well as the marketing possibility of electric heating.

Kansas City Power & Light Company officials point out that increased use of air conditioning in the area has forced the company to install equipment designed to meet the maximum demand. December is no longer the peak load month. Now the big dilemma is to build up the winter load.

"Sooner or later we've got to sell electric heating in order to cut down the heavy load impact of air conditioning," said one of the company heads. "With nothing to work from, establishing rates has posed quite a problem."

"We know, however," he said, "that the heat-pump-type installation is the answer for this area. But we'd like to see more improvements in the performance of the heat pump compressor to step up the Btu."

One of the staunchest supporters for electric heating in the Kansas City area is C. W. Schumacher, president of Air Contractors, Inc., mechanical contractors company and air conditioning and heating specialists, and vice-president of General Heating & Cooling Co., distributors of General Electric heat pumps.

Mr. Schumacher firmly believes that once rates are fixed this area will see electric heating units installed in 1,000 of the 10,000 homes built annually. The contracting company he heads has installed seventy-eight electric heating jobs in new homes, and, says Mr. Schumacher, "there's not an unhappy customer among them. They're all completely sold on the convenience, the safety features, and the cleanliness of electric heating."

"These homeowners," he added, "also like the idea of getting away from twice-a-year service problem of starting their air conditioning up in the summer and their heating units in the winter."

In the past, electric heating installations have been confined to homes in the $25,000 and above category. But in St. Louis a development of homes priced at $19,750 equipped with electric heating units was recently opened. In Independence, Kan., recently, the FHA approved seventeen homes priced at $16,500 which will be heated with electrical power.

Kansas City's first all-electric home, above, required 10,667 kwhr of electricity to heat last winter and 4,611 kwhr for four months' cooling. Taking up only a small space in the garage, below, the single 5-ton heat pump with 14 kw of resistance heat.

Costs are down

With costs going down steadily on the heat pumps—reduced 35% in the past year—and with further reductions in sight, Mr. Schumacher points out that even now basic costs for installing electric heating and air conditioning run only 10% higher than conventional equipment which includes furnace, cooling unit, induced draft, cooling tower, etc. Costs for the average combination electric cooling-heating installation run about $1,800 for the 3-ton unit and $2,800 for

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Heat load regulators favored in Florida

One of the essentials of electric heat installations insisted on by Florida Power Corporation is a load regulating device which will minimize the heat load on the residential peak, thereby reducing the requirements for service facilities.

◆ THE CITY OF ORLANDO, expanding in all directions due to the influx of new businesses and spreading housing projects, is literally bursting at its seams. This fact plus the ever increasing popularity of electric heat has thrown a tremendous strain on the local power plant.

"However," says C. H. Stanton, general manager of the Orlando Utilities Commission, "while it is not our policy to solicit new business, we never turn down a request for additional power. Our five and a quarter million dollar expansion program is about ninety-five per cent complete, and when finished will put into operation a 115,000 volt distribution loop around the city. We feel that this will take care of the increased demand, due to the growth of the city and the rise in electric heat installations."

"Concerning electric heat installations," continued Mr. Stanton, "we believe the problems involved are best worked out by the contractor and builder. However our engineers are always available for advice and recommendations if their assistance is requested.

"We have no demand charge, nor do we require a load regulator. We offer no special rate on electric heat outside of the fact that all residential billing over 80 kwhr automatically falls into the lowest rate bracket of 1.5¢ per kwhr."

Outside the City of Orlando, electric service is supplied by the Florida Power Corp. They also maintain a policy of no solicitation, except for heat-pump installations. Mr. Johnson, general manager of the Orlando Florida Power office states: "Heat-pump installations enable us to maintain a balanced load, and naturally we push for such jobs whenever possible."

In contrast to the City of Orlando Utilities Commission, the Florida Power Corporation offers a complete engineering and advisory service on electric heat. Toward this end they have compiled a book of instructions and specifications called "Guide for Calculations of Electric Space Heating."

Two basic rules

Florida Power Corporation insists on strict observance of two basic essentials on electric heat installations (other than heat pump units): (1.) Minimum installed kw capacity through the use of insulation and adherence to sound heating and engineering practices. (2.) A load regulating device which will minimize the heat load on the residential peak, thereby reducing the requirements for service facilities.

Heat installations may be made without a load regulator, but then Florida Power Corporation makes a charge of $1 per kw demand over the amount of electricity used, with a minimum of 5 kw at $1 per kw for five months. Thus a billing of $30 with a heating system of 10 kw demand would show a gross bill of $40.

However, Florida Power Corporation maintains that the advantages of the load regulator far offset its cost. They claim the regulator minimizes the increase in size of the main entrance requirements, resulting in reduced wiring costs. Also that it eliminates the demand charge with no sacrifice in comfort. And that finally through the outdoor thermostat it gives better temperature control by bringing the capacity of the heating system in line with weather conditions and heating requirements.

In operation the regulator must limit the space heating load to a minimum of 25 per cent connected load when the combined demand of other uses (range, lighting, etc.) exceeds a preset value not greater than 6 kw nor less than 2 kw. The regulator must have a maximum current capacity of 100 amperes.

Proper and adequate insulation is heavily stressed by the Florida Power Corporation in their electric heat guide so that "heating

View of section of new electrically heated homes in the Azalea Park subdivision, Orlando, Fla. Over 2,000 homes have been built in this development, the last fifty having electric heat. Plans call for all future homes in this subdivision to be electrically heated.

costs will then compare favorably with conventional heating methods." They require a minimum of 4 inches of ceiling insulation and strongly recommend an additional 2 inches insulation in walls and the weatherstripping of all outside doors and windows.

With a gradual increase in customer and contractor education, electric heat is finding ever increasing favor among both builders and buyers in Orlando. Since 1951, which marked the first residential installation, all types of electric heat including space heaters, wall units, heat pumps, baseboard and cable in ceilings, walls and floors have found good acceptance. To a great extent this progress has been due largely to the efforts of Robert Peacock, lighting and electric heating engineer of Hughes Electric Supply, Orlando, Fla.

Consumer education

In 1951, Hughes Electric Supply started a program of consumer education on electric heat through a series of advertisements in the Building and Real Estate Section of the local papers. Results have shown up in installations of all sizes.

Mr. Peacock has kept a pictorial record, both still shots and movies, of the progress of electric heat installations in Orlando. The still photos are mounted in a large binder with detailed information alongside each photo on construction, insulation and season heating cost. The 16 mm movies are shown right in Mr. Peacock's office and enable contractors to see how various electric heat problems have been solved.

In addition, Mr. Peacock has drawn up a simplified formula for figuring wattage requirements and installation costs for this particular area. He has also compiled a list of guide points and pertinent suggestions as a contractor aid in making properly engineered installations. A calculation sheet, for the convenience of contractors, has also been drawn up and printed by Mr. Peacock.

Installation pointers

"Every effort is made," says Mr. Peacock, "to assist the contractor in his installation and we are happy to do the actual figuring on any job."

Mr. Peacock states that in all the jobs they have figured there have been very few complaints, how-

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Florida case histories of electric heat

ORLANDO, FLA., HOME, built by Harvey G. Rohling Orlando. Electric installation by Miller Willis, Orlando. Two bedroom, concrete block construction. Contains Florida room, living room, dining room, kitchen, bath and two bedrooms. Has 6" blown in rock wool insulation on ceiling and aluminum covered rock lath on outside walls. Florida room has terrazo floor, other floors are of wood. Approximately 1400 sq. ft. living area. Ceil heat cable installed in ceilings. 1600 watt in each bedroom, 3000 watt each in Florida room and living room, 2000 watt in the dining room, 1200 watt in the kitchen and a 100 watt electric glass unit heater in the bath. Heating bills for the past season were: Nov., $13.60; Dec., $30.29; Jan., $47.04; Feb., $20.94; Mar., $19.53; Apr., $10.48; and May $8.09.

INTERIOR VIEW OF business building, Orlando, Fla. Building is on concrete block construction and contains three offices plus a reception room and a stenographer room. It is L shaped and approximately 16x32x24 in size. Owner built with electric installation by Clark & Hodges, Orlando. Has 6" blown in rock wool on ceiling with aluminum covered rock lath on outside walls. Ceil heat cable is in concrete floor. Plastic tile covers floor, walls are of mahogany plywood with acoustic tile on ceiling. The building contains a total of 11 kw with three kw in the reception room, two kw in the stenographer's room and two kw each in the three offices. Heating bills for the past season were: Dec., $13.74; Jan., $20.81; Feb., $34.24; Mar., $14.90; Apr., $10.11; May, $3.00.

Ceiling heat cable

Although Stuart Thomas, of Mississippi Power and Light Co., did not build his home with the idea of becoming a guinea pig for electric heating, it is a fact that his ceiling cable heating has centered the attention of Mississippi contractors and home builders on a type of electrical heating that many say will result in a surge of demand for similar types of electrical heating.

◆ ONE OF THE MOST effective means used in the promotion of electrical heating in Jackson, Miss., was the actual building of an all-electric house by Stuart Thomas, Central Division sales manager, Mississippi Power & Light Co.

A Certified Adequate Wiring job all the way through, the Thomas house is the only installation of radiant ceiling cable in the Jackson area.

Said Mr. Thomas, "when my wife and I started planning our new home, we thoroughly investigated the practicability of heating it electrically. When all factors were taken into consideration, we decided that electric heating was the most economical and practical system to install. We have lived in our new home since early February, 1956, and are entirely happy with our decision to use electric heat."

Of dry - wall construction throughout, heat is obtained in the Thomas house by means of heating cables imbedded in the ceilings of each room, and also under the tile floor in the bathroom.

Room thermostats

Heat in each room is individually controlled by a thermostat which gives perfect temperature control for any room in the 1100 square foot house, which contains two bedrooms and a den, living and dining room combination, an all-electric kitchen and attached double-car garage.

"Some of the features that we especially like," said Mr. Thomas, "are the complete uniformity of the heat, with no more than a 2-degree temperature difference in any room; no fans or moving parts—no great velocity of air movement, and no floor or wall space taken up by equipment or ducts."

For this type of radiant heating, proper insulation is an absolute necessity for efficient operation, temperature control, and economy. In the Thomas house the heating cable manufacturer's recommendations for insulating were carried out. Ceilings were insulated with 6-inches of blown in loose insulation; 4-inch rock wool batts were used for the walls; and 2-

An electrician installs heating cable on ceilings of the Stuart Thomas all-electric home in Jackson, Miss. Note 4-inch insulation batts in the walls. Cable is stapled about 3-inches apart and about 6-inches from walls. At right, heat cable was installed under tile floor in bathroom.

in all-electric home

inch batts under the wood floors.

This insulation cost cannot be considered an extra expense to be added to costs for electric heating, said Mr. Thomas, as he pointed out that not only does the insulation provide comfort and economy in heating; but also provides the same features for his air conditioning during the summer months, which in this case is handled by two room air conditioners.

Regular house wiring and installation of the heating cables in the Thomas house was performed by Robertson Electric Co., Jackson. A competent electrical contractor, usually working four men, Ed Robertson used the manufacturer's recommended procedure for installing the heating cables which come in different wattages and lengths.

Cable specifications

The cable specifications used in this house are: living room and dining area, 3000 watts; front bedroom, 1400 watts; rear bedroom, 2200 watts; den, 1400 watts; kitchen-dinette, 2200 watts; bathroom ceiling, 500 watts; bathroom floor, 500 watts; all at 240 volts.

On this dry-wall construction procedure, Mr. Robertson, with one helper, used a stapling machine to fasten the cable to ⅜-inch sheetrock already in place. The cable was looped back and forth across the ceilings on 3-inch centers. After inspection by the city electrical inspector, another layer of ⅜-inch sheetrock was installed by carpenters over the cable. The location of the cable is marked on walls so carpenter would not nail through cable.

About 30 man-hours were required for this installation. However, Mr. Robertson indicated that future jobs of the same size could be done in about 20 man-hours using two men. He explained that this was the first job of this type for himself and crew, which slowed things up a bit.

Ed Robertson is enthusiastic about the future of this type of electrical heating in Jackson; in fact so much so that on several jobs now pending he has offered to have the house insulation installed at cost in order to prove that electrical heating of this type is practical.

Mr. Robertson said he checked this job several times after completion and was impressed with the even temperature in every room; all rooms are thermostatically controlled. He indicated that this size installation figures at retail about $375 - $400 for labor and material.

Electric heating energy used for this installation amounts to approximately 11 kw. Number 2 entrance wires and 26 circuit split-buss panels were installed to take care of this all-electric house.

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Exterior view of all-electric home, above, owned by Stuart Thomas, Central Division sales manager for MP&L Co. This house features first heat cable installation in Jackson, Miss. Below, Mr. and Mrs. Thomas shown in the light-conditioned living room. Thermostatic controlled heating cables in ceilings furnish even heat and allow wall space.

Heat pump progress in Texas

For Gulf States Utilities, the heat pump was the answer for a single unit to cool and heat the entire house and, at the same time, be within reach of most customers. Because of its reverse cycle principle, the heat pump is promoted every month in the year.

◆ RESIDENTS along the Gulf Coast of Western Louisiana and East Texas have a bigger problem of deciding on the right kind of electrical heating for their homes than their neighbors located a hundred or so miles inland. The reason for this is the extremes of hot and cold weather in both the spring and fall months of the year.

A number of regular resistance electric heating for homes have been used and studied by contractors, wholesalers, as well as utility company heads. The result of this type of heating has been good. However, due to fully 75 per cent or more homes in this area being one-story structures, and many of these of the ranch style design, these men looked for a different unit to cool and heat the entire house, and at the same time, be in the easy reach of every customer in their territory.

The heat pump came along and was installed in a new home by a Beaumont contractor. Gulf States Utilities worked hand-in-hand with the contractor and the home owner, and after the home was completed, it was opened to the public for one week for inspection. Utility salesmen passed out literature and answered questions on the heat pump's operation.

There are now 317 heat pumps in operation on the Gulf States Utilities lines serving customers from Baton Rouge, La., to Navasota, Texas. Of these, 223 are in homes, 76 in commercial use, and 18 in company use. Fifteen of these pumps were installed during the month of May.

Promotion program

Since the heat pump operates on a reverse cycle principle to provide heat in the winter and air conditioning in the summer, the utility company promotes it every month in the year. Here is how some of the promotions work.

First, there is a meeting of utility salesmen with both wholesalers and contractors at least once every three months to lay out plans for the different promotions to be used during the next three months. All problems are discussed at the meeting and ways of eliminating them are suggested. The company issues bulletins between meeting to bring current information to these men.

Next, the utility company takes pictures of every home and it's owner that installs one of the pumps. One or more of these homes are featured in the home building section of the local Sunday newspaper. The rest of the homes are placed in a large book that can be shown to prospective customers. The amount of kwhr are kept for comparison.

Color slides are made of almost every home and commercial building that has a heat pump installation. These slides along with a projector, complete information on the house, it's construction and insulation, number of rooms and size of heat pump installation, are available to all contractors to show to prospective customers. As an extra feature, the utility company will furnish a salesman to assist with the showing and answer any questions the prospective customer may have.

Wiring allowance offered

Next, to encourage new home builders to wire their homes for some type of electrical heat, the company has set up a special cash allowance to give to customers who wire their homes for electrical heat when building. For instance, a $175 allowance for wiring for a 2-ton heat pump is made. For a 3 to 5-ton unit, the company makes a $200 allowance.

For other types of heating, the company will allow $10 for each unit the customer wires for. Payment for the different wiring is made to any building contractor, speculative builder or home owner. All wiring must meet code re-

V. G. Gayle, left, head of the public relations department of Gulf States Utilities, examines the heat pump installation with the new customer and asks for his comments. This follow-up call, part of the Gulf States program, helps build customer goodwill.

quirements, local inspection and company wiring inspection. Also, it must be in homes on company lines.

A special winter rate is set up to encourage customers to use some type of electric heating for their homes. All kwhr used during any winter month in excess of 600 kwhr of total monthly use will be billed at 1.5 cents per kwhr used per month. Winter monthts are the six months of November to the following April, inclusive. This is a saving of more than a half-cent for each kwhr used over 600.

When a prospective customer is reluctant to install a heating system in his home while it is being built, both the utility company and the contractor encourage him to go ahead and wire the complete home for some type of electric heat since it will be paid for by the utility company. Usually the customer will install at least one electric heater, usually in the bathroom. After comparing this one heater and its safety and cost with other types of heating, they find the customer will soon decide to use electric heat to supply the entire house.

Heat pump advantages

In the 223 homes where the heat pump has been installed, the average home used total annual kwhrs of 13,136. Where the resistance heating was used, the annual kwhrs used was 18,159. Another big factor in promoting heat pump sales has been in the fact that it can be used for heating and cooling as a year around fixture, thereby cutting the cost for two different heating and cooling fixtures, as well as the saving over other types of electrical heating. So the saving in kwhrs using the heat pump has been over 5,000 kwhrs over resistance heating.

Contractors, wholesalers, as well as utility salesmen are all promoting resistance heating, too, because of the favorable low cost of a recent heating season by a customer. For a five months winter period, the resistance heating cost was slightly over $9 per month. Therefore, these men feel with the heat pump they have a installation with-in the price range of the average man. And with the resistance heating, they have something to offer the customers with the larger and better homes.

During the first five months of 1956, inquiries and sales of both types of electrical heating has been

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Louisiana case history in electrical heating

◆ THIS EIGHT-ROOM brick veneer home in Lake Charles, La., is heated with radiant glass units with fibreglass insulation 4-inches in attic, 2½-inches in walls. Two bedrooms have one heating unit each rated 1500 watts, and the den has one unit 1500 watts. The living room has two 1500-watt units, and due to large size, one 500-watt overhead unit. Combination dining room and kitchen has one large 1500-watt unit. Large bath has one 1000-watt unit, small bath one 500-watt overhead unit, and hall one 500-watt overhead light unit.

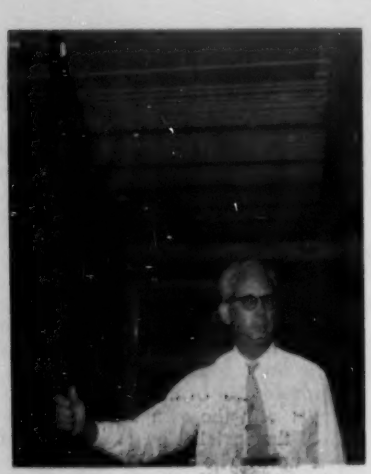
Starting on November 1, 1955, and running through March 31, 1956, the average heating cost for the 1800 sq. ft. home was $49.03 or $9.81 per month. Utility rates are first 40 kwhr at 5.5¢; next 60 kwhr at 4.1¢; next 300 at 2.3¢; and additional kwhr at 2.1¢. A special rate to encourage electric heating is in effect from November 1 to April 1. This rate is 1.5¢ for all kwhr used in excess of 600 for any one month. Starting on November 1, 1955, and running to April 1, 1956, a total of 2488 kwhr were used to heat the home. An average of 498 kwhr were used each month.

Gulf States Utilities worked very closely with the owner and contractor in the installation of the radiant glass units. The owners are so satisfied with the installation, they offer to conduct prospective customers through their home and explain its operations.

Ceiling heat installations

Ten years ago, less than one per cent of homes in the Tennessee Valley were heated electrically. Now, at least one home in ten has it. A survey of 1,218,000 consumers in the TVA area showed 145,000 or 11.9 per cent using electricity only for home heating.

◆ ELECTRICAL CONTRACTORS in the Knoxville area have seen the development of electric heating of homes from a few before World War I to the use of it in most new homes today.



Stuart Fonde, an electric heating pioneer, looks over a ceiling heat job at one of his Knoxville homes.

Stuart Fonde and M. L. Bartling, Jr., pioneers in electric heat research, check a ceiling heat job.

The pioneer in research and in building of low-cost quality homes with electric heat was Stuart Fonde.

Research and experiments

In the 1930's, he built two electrically heated homes as a starter, but had to guarantee the fuel bill. He stressed the need for insulation of homes then, and he still does today. One of his first homes built for electric heat was guaranteed to have a yearly fuel bill of not more than $72.50. The actual expense was $39 that year. However, that house was occupied by a couple who worked in the daytime.

On another house, the bill was guaranteed at $62.50. The actual bill was $52.50. There were two children who, in playing, were going in and out of that house too.

From the first houses built for electric heat, Mr. Fonde "gained the assurance that electric heating was not only the best heating, but the lowest in cost available then."

When he built a Highland Hills subdivision he showed how savings of an all-electric home would save the cost of a maid.

His Meadow Hills subdivision, also built before World War II, was carefully watched by electrical contractors, utilities, and others interested in the possibilities of electric heat. For years afterwards they were considered a model for electric heating.

On a signboard at an entrance to Meadow Hills, Mr. Fonde offered the homes at from $3100 up, including lots. The homes later more than tripled in worth. The average heating cost of those homes per season was about $40.

The results at Meadow Hills "removed all doubt about the practicability and economy of electric heat."

Various wall heaters were used at first and then there were experiments with other forms of electric heating, including panels. Research was done on ceiling heat in the 1940's, in which J. E. Goff and M. L. Bartling Jr., joined. Mr. Goff conducted experiments at the University of Tennessee laboratories in Knoxville.

Homes were being heated by ceiling heat in 1949. The cost for installing it in the average six-room, insulated home was figured at approximately $600. That included everything and gave automatic control in each room. The average fuel bill for such a home was from $60 to $70 per winter.

Electrical contractors interviewed in the Knoxville area agreed that the trend during the last several years has been to ceiling heat installations and it leads all others at present.

Recent estimates on an average 6-room house of 1200 square feet are: first equipment and installation cost, $400; extra insulation necessary, $125; total initial cost $525; yearly fuel cost, $108.88; 20-year operating cost, $2177.60; 20-year total heating cost, $2702.60

Cost comparisons

Comparisons were made with automatic circulating air systems, etc., like this: initial equipment and installation cost, $750; electrical wiring cost, $50; flue and chimney costs, $75; equipment and fuel storage space (at $12.50 per square foot), $200; total initial cost, $1075; annual maintenance cost, $30; annual depreciation cost, $16; yearly fuel cost, $101.25 total yearly operating cost $147.25; initial cost, $1075; 20-year operating cost, $2915; 20-year total heating cost, $4030.

For hot water or steam systems, the figures are: initial equipment and installation cost, $1600; electrical wiring cost for system, $50; flue and chimney costs, $75; equipment and fuel storage space, $200; total initial cost, $1925; annual maintenance cost, $30: annual depreciation cost, $31.80; yearly fuel cost, $101.25; total yearly operating cost, $163.05; initial cost, $1925; 20-year operating cost, $3261; 20-year total heating cost, $5186.

lead in Tennessee Valley

The electrical power costs were based on rate of 1¢ per kwhr.

Today there are more electrical heating jobs on radiant heat in the ceiling than any other kind in the Knoxville area.

Contractors' comments

W. E. Briscoe, of Briscoe Electric Co., said, "Most of the new homes are installing radiant ceiling heat. For bathrooms and small halls though I believe wall heaters are better."

E. E. Turner, of Turner Electric Co., was one of the first electrical contractors in the Knoxville area to put out a sign, "Electric Heat." His first jobs included converting units at motels to electric heat and that attracted wide attention. One of his most recent big jobs was an unusual electric heat installation for the modern new Municipal Building at Maryville, Tenn., occupying an entire block. Mr. Turner sees a trend in the future to a combination of heating and air-conditioning.

L. P. Self, of Knoxville Electric Co., also finds ceiling heat installations leading at present, with a slight trend toward baseboard and walltype heaters.

John Sherrod, of Sherrod Electric Co., sees a trend toward all-year conditioners, especially among the more expensive homes.

M. A. Griffith is the electrical contractor doing the heating installation on a new group of Fonde houses in a woodland suburb. That is a ceiling heat job.

H. D. Roden, president of Roden Electrical Supply Co., says his men often give help to electrical contractors in planning jobs, especially on ceiling heat. Mr. Roden has salesmen who "call on the trade and are capable of figuring electric heat." Sometimes a salesman will go with the electrical contractor and go over a proposed job with him.

Although ceiling heat leads, Mr. Roden finds a continuing demand for all kinds of convection wall heaters, fan type wall heaters, baseboard type of heaters, and others.

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Jack W. Goans, left, heating specialist of the Knoxville Utilities Board, displays the sign given for the job by the Tennessee Valley Adequate Wiring Bureau when a home is certified for adequate wiring, which is also important for electrical heating.

In pioneering days of electric heating, one Stuart Fonde idea to sell electrically heated homes was this mailbox on a post in a vacant lot with green lettering on a white sign: "You can put your name on this box and own a modern home for as little as $25 a month, 10% down."

Gas competition slows electric heat progress

◆ ALTHOUGH electric heating for homes is definitely in the future in Missouri and the middle western states, most rate structures are too high for economical electric heating especially in competition with natural gas.

However electric heating is making strides in isolated instances. At Butler, Mo., a bid will be made by the utility for electric heating load in residences. The city has a new diesel plant as well as power available through interconnection from long high lines.

One of the largest distributors of electric heating equipment in the mid-west reports residential heating activity in Cassville, Mo., Mountain Home, and Salem, Ark., as well as a definite trend toward electric heating. A need for more promotion and educational programs to show the possibilities and advantages is seen for the entire territory A few wholesalers and a few utilities have so far been carrying the load in this respect with but small gains to report.

Considerable electric heating activity in residential construction is reported from Willow Springs, Mo., where an REA rate is favorable in competition with other fuels. But all of these areas are low population centers, Willow Springs, Butler, Salem and Mountain Home are small towns.

In St. Louis, Hampton Electric Company has pioneered electric heating for many years, and several other contractors have made electric heat installations. Here the Union Electric residential heating rate is fair and in the neighborhood of the minimum of a cent and half required to make electric heating feasible.

Hampton made many electric heating installations in remodeled residences of all sizes but during that time gas restrictions prevented connections with existing heating systems and permitted only a limited number of new furnace hookups in new subdivisions which thus increased the interest in electric heating. Now, new storage facilities for the Laclede Gas Co., provides a standby supply for winter months and new gas connections are being permitted on a fairly large scale.

The use of electric heat from the utility standpoint is assuming much greater interest in the cold belt of the middle west because of the changing characteristics of the utility load.

S. S. Sansbury, manager of the Development and Training Division, of the Union Electric Company of Missouri, points out that the rapidly growing acceptance of air conditioning during the hot summer months has changed the peak load from winter to summer. It appears that the summer load

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Missouri case history of electric heat

HAMPTON Electric Co., St. Louis, one of the contractors pioneering electric heating in this area where the winter temperatures go to 10 or more below zero, wired the William Gebbert home about four years ago and the owners have developed into enthusiastic electric heat users.

Mrs. Gebbert said it was the most comfortable heat that they had ever experienced and that their four children suffered less from colds than with other kinds of heat due to the absence of drafts. She said the cleanliness is a big item, with no accumulation of dirt on painted walls from year to year. She particularly praised the zone control features which permit perfect regulation of varied temperatures in different rooms.

The low step of 1¼ cents on the Union Electric Company schedule applies to most of the heating kilowatt hours. Total heating cost is estimated at $180 for the 1955-56 winter season, which is probably less than other fuels would have cost.

The Gebbert home is of frame construction, with five rooms and bath. Ceiling has 4 inches of insulation while walls and floor are insulated with LOK # 624. Windows and doors are equipped with storm sash.

Radiant glass wall mounted panels were installed in individual room temperature control. The living room, dining room-kitchen, and largest bedroom are each equipped with 2000 watts of heating capacity; two additional bedrooms and a bathroom are each heated with a 1000 watt unit. The design temperatures are 0° and 70°. Total heat loss of house was calculated as 28,405 Btu/hr.

Total electric bill for period May 1955 to May 1956 was $275 for all usage including electric space heating and electric hot water heater. Power company estimates actual heating cost alone for the 1955-56 season at approximately $180.

Memphis heating installation requirements

In the county areas outside Memphis, where the natural gas rate is higher and the residential electric rate is the same as in the city, the trend is toward electric heating. Because of the growth in air conditioning, it became desirable for Memphis Light, Gas & Water Division to offset summer peaks with a limited amount of resistance heating, and last year a new policy directive covering installation specifications changed the whole picture.

◆ DESPITE low-cost natural gas, Memphis home builders and buyers in increasing numbers are turning to electric heating. And the trend is even more pronounced in the Shelby County metropolitan area outside the city.

Latest figures by the Memphis Light, Gas & Water Division, which manages both the municipally-owned electric and gas distribution facilities, show approximately 1,000 homes in Memphis now heated electrically, and nearly 4,000 homes in the county using electric heat.

The city figures are considered amazing, when it's realized that the average home in Memphis can be heated with natural gas for about 20 per cent less than with electricity.

This isn't true, however, in the county areas outside Memphis. There the natural gas rate is higher, while the residential electric rate is the same throughout the LG&WD system that blankets the county as well as the city. And being TVA current, the electricity's rate is unusually low when compared with other areas served by private utilities.

Growth factors

A big factor in the growth of electric heating undoubtedly is the confidence homeowners and builders have in the LG&WD rate remaining fairly constant in the future. The city, served by TVA for two decades, is now preparing to erect its own generating plant, a $150,000,000 undertaking that will hook on to the transmission lines when the city's contract with TVA expires. This new city-owned plant is the outgrowth of the celebrated Dixon-Yates controversy.

Location of gas mains also is an important factor in use of electric heating. Where it involves long extension of gas mains in county areas not presently served by natural gas, many builders look to electric heating or butane gas.

Most homes heated electrically use radiant heat, with the cables in the ceiling. However, reverse cycle or heat pump installations are growing in popularity. While more expensive, they have the decided advantage of year 'round comfort. Heat pump installations are found in the more expensive homes, such as those in the $20,000 to $40,000 class, and up.

The LG&WD for a long time discouraged the installation of resistance space heating to avoid the abnormal winter peaks, due to cold weather, that distort the system's electrical operation.

Then on March 1, 1955, came a new policy directive that changed the whole picture. Because of the growth in the air conditioning load, it became desirable for LG&WD to offset the summer peaks with a limited amount of resistance heating.

To this end, it issued tentative specifications (which are still in effect more than a year later) under which electric heating is permitted. It was felt that compliance with these specifications would reduce the cold weather demand and at the same time provide economical heating for the householder.

The new regulations spelled out insulation requirements that promptly made many electrical and home contractors bleat. Immediately, in the county areas outside the city, the builders of cheaper homes shied away from electric heating. Supply houses also felt the shock.

However, the directive had little effect on the builders or buyers of more expensive homes. One contractor, who estimates that for years he did about 80 per cent of the electric radiant heat jobs in the county, said the new regulations actually have helped him and have been a blessing in disguise.

Before the new LG&WD regulations went into effect, contractors could build homes and equip them for electric heat for about $100 less than those homes designed for central gas heat. This naturally made such homes more profitable for the builder. There was an extra $100 profit in each house for the builder. Now many of them are not so anxious to install electric heat, since the profit angle is missing because that $100 — and often more — has to go into insulation to meet the LG&WD regulations.

Insulation dividends

Yet it is freely admitted that proper insulation of a home pays dividends the year 'round, and in many cases pays for itself in reduced heating bills in from three to five years.

The LG&WD statement emphasized this. "We are quite sure that any expenditure made for insulation will be reflected in the low annual operating cost to the householder."

As a LG&WD official summed it up: "Electric heating is more economical when a house is properly insulated. Also, air conditioning is more economical. A homeowner can reduce the size of air conditioning units, the electrical units — and the cost of operation — by properly insulating.

"We figure electric bills can be cut as much as 30 to 40 per cent by properly insulating the family-size house. This gets the cost down where it is comparable with natural gas.

"Electric heat is roughly 1½ or 2 to 1 that of the cost of gas. In other words, it's 50 to 100 per cent that of gas, depending upon the location and other use of energy."

Heating regulations

The LG&WD regulations covering the installation of electric resistance heating for residences provide, in part:

(1) Residential electric resistance heating will be permitted in new living units up to and not exceeding 5 kw connected capacity for any one single family unit.

(2) New single family dwelling units using more than 5 kw of electric resistance heating will be permitted under the following conditions:

(a) Exterior walls shall be so constructed and insulated that their heat transmission as determined by the latest edition of the A.S.H.&V.E. Guide will not exceed .10 Btu per square foot per degree F. difference between inside and outside temperatures.

(b) Ceiling areas under roofs or adjoining unheated attic spaces shall be insulated with four inches of rock wool or the equivalent insulating value in other materials. Where ceiling panel heating is installed, such ceiling areas shall be insulated with six inches of rock wool or the equivalent.

(c) Side-walls of heated rooms which adjoin roofs or unheated attics shall be insulated with not less than three and five-eighths inches of rock wool or the equivalent.

(d) Floors above unheated crawl spaces or basements shall be insulated with not less than a one-inch composition insulating board or with other materials of the equivalent insulation value. Floors above unenclosed areas or unheated garages shall be insulated with not less than three and five eighths inches of rock wool or the equivalent.

(e) Concrete slab floors on the ground shall be insulated around the perimeter of the slab with not less than a one-inch composition insulating board or equivalent insulation of other materials, and such insulation shall extend down beside the foundation for a distance of not less than 18 inches below the floor level or shall be extended back under the floor slab for a distance of at least 18 inches from the outer edge.

(f) Exterior windows of heated rooms shall be equipped with storm windows or shall consist of double glass windows having an air space of not less than one-quarter inch.

(g) Heating equipment shall be sized for not more than 70 degrees difference between inside and outside temperatures.

(h) All materials shall conform to the A.S.H.&V.E. Guide.

(i) All openings shall be weather-stripped in an approved manner.

Plans approved

(3) All plans for electric heating and insulation of the heated spaces shall be approved by the Commercial Department of the Memphis Light, Gas & Water Division.

(4) Old structures which do not readily adapt themselves to insulation as herein proposed for new construction may be heated with electric resistance space heating provided the ceilings, walls, floors, windows and openings are so reconstructed and insulated as to be equivalent to specifications herein set forth for new construction.

(5) Reversed cycle units (commonly called the heat pump) augmenting the heating capacity with resistance heating in excess of 9 kw may be installed only in case the structure is insulated as herein specified.

(6) Whenever a customer is presently being served, the customer may add up to and including 5 kw of resistance heating and this Division will make any change in the transformer capacity needed to serve the customer's regular domestic and heating loads.

(7) Whenever resistance heating in excess of 5 kw is added to the customer's load, the cost to the Division to supply the resistance heating load shall be paid for by the customer less 4 times the estimated annual revenue derived from the heating load on a non-refundable basis.

(8) Whenever an extension is required to serve a customer including resistance heating in excess of 5 kw, the cost of the extension other than those costs required to supply the heating load shall be paid for by the customer on a 4 to 1 refundable basis as required elsewhere in the Rules and Regulations of the Division, but the additional cost to serve any resistance heating in excess of 5 kw shall be paid for by the customer less 4 times the estimated annual revenue derived from the resistance heating units on a non-refundable basis.

(9) Whenever a builder wishes to construct a group of houses in an approved subdivision and wishes to heat these houses with resistance heating, the excess cost to the Division required by the electric heating shall be paid for in cash on refundable basis in accordance with the Rules and Regulations of this Division.

The LG&WD is promoting the use of elecric heating by cooperating with contractors and by use of window displays in its downtown main office.

Memphis gas rates are lower in the city than in the surrounding suburban area. Excess over 10,000 cubic feet per month is being billed at 5¢ in the city as compared to 6½¢ per 100 cubic feet in the fringe area. For this reason, electric heat has had more appeal in the county areas than in the city.

Rates comparable

Yet homes properly insulated and weather-stripped and with storm sash can enjoy electric heat on a level comparable with gas, Frank O. Davis, of Frank O. Davis Electric Co., emphasizes.

Mr. Davis, who started business in 1917, made his first electric heat installation in 1941. His installations are of the ceiling, radiant heat type.

Until the last several years, Mr. Davis estimates he did about 80 per cent of the electric heating installations in the county. He uses color and black-and-white slides for illustrations to promote this type heating. He can point to several hundred installations, which include homes, garage apartments, and extra rooms.

His own home is heated electrically. Here's what he says about electric heat:

"I heat my home, with 1,800 square feet, for $18 to $20 a month. It's well insulated but isn't weather-stripped. I recently wired a two-story, 2,300-square foot home for electric heating and the heat bill this past season totaled only $144. Another house, six-rooms with 1,500 square feet, was heated last season for $97. I am willing to guarantee my installations to within $10 a season on the heat bill. In most cases, the electricity bill is anywhere from $3 to $5 under my estimate.

"I recall one job where the complete installation ran about $2,000. The man really didn't want this type heat but his wife did. After the installation, he paid me $1,000 and said he would pay me the other $1,000 after the heating season if the system did what I said it would do. I didn't worry about it. Then one day I got a call from him. He said he was mailing me another $1,000 check and was completely satisfied.

"He's thoroughly sold on electric heat now. In fact, I have sold five more jobs off this one installation.

"My electric heating installations normally run around $100 a room, including the cable and workmanship, but exclusive of lighting. I have put electric heating in some homes selling for as much as $40,000 and including 4,000 square

feet. For bathrooms, space heaters rather than radiant heat is used in most cases. A bathroom space heater can be put in for about $50, and reduces the overall installation cost by about that sum.

More ceiling heat

"Most of my installations are in the ceiling. Few wall units are put in except for the cheaper homes."

Mr. Davis makes installations in wet plaster or dry wall construction. The heating cable operates at 104 degrees. He points out that floor installations which must operate at 80 degrees are not as effective or as comfortable.

What about the life of such installations?

"Certainly they can be expected to last for 20 years at least, or the normal life of the home. I haven't had to replace a cable yet," he said.

"Radiant, electric heat can compete with any type installation, cost-wise, except floor furnaces. And when you emphasize the many benefits of electric heating, it isn't too difficult to sell.

"For example, it's cleaner. There are no fumes or sweating. Frequent cleaning of draperies is eliminated. Redecorating is cut to a minimum.

"Electric heat is ideal for those enlarging a home by adding a room, fixing up the attic or making a garage apartment. It makes such construction possible without disturbing the existing heat system pattern, and it is less expensive to install."

How about the reverse cycle or heat pump?

One Memphis distributor, Cook & Nichol, Inc., (General Electric) reports its Weathertron steadily gaining in popularity.

"G-E put the Weathertron on the market in 1952," a Cook & Nichol official recalls. "Production, based on demand, is 300 per cent higher now than was originally anticipated for this date. The heat pump is very popular in the TVA and other low-priced electricity areas.

"Originally we expected most of the demand to come from commercial prospects. Now our sales are about 50-50, commercial and residential.

"Heat pumps are being installed in residences of 1,000 square feet and up. Normally, they are found in $15,000 or higher priced homes. They are not for haphazard construction.

"In Memphis, a home up to 1,500 square feet, using a three-ton heat pump, can be heated and cooled the year 'round for close to $20 a month. The bill for a year runs $225 to $250, on the average. For a five-ton heat pump, the cost of operation would be around $300 a year.

"The heat pump usually costs more to operate for heating than for cooling. A five-ton unit in a normal Memphis home uses about $16 to cool the house, and up to $33 to heat it.

"Most homeowners report the heat pump is more economical than gas. They are very happy, especially with the new model. These units are quiet and clean. There's nothing to compete with them for cleanliness.

"Another advantage of heat pump use is that relative humidity is higher in winter with its use. You eliminate the dry heat associated with gas.

"However, homes must be well insulated for best use. In some cases we recommend insulation in the floors as well as the required insulation of walls and ceilings.

"As for wattage, a five-ton unit

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Alabama electric heating case history

AMONG the growing number of satisfied users of electric heating in Alabama is James C. Nelson, whose home is at 2266 Riverside Drive in Mobile.

Mr. Nelson wrote the Alabama Power Co., which services his home: "I have found the cost of electric heating very economical, but most desirable of all is the uniform temperatures for each individual room, where every unit is controlled separately."

The Nelson residence, built in late 1953, is of modern brick veneer with a double-wood floor over an enclosed crawl space. It consists of three bedrooms, two baths, living room, dining room, kitchen and utility room. Total area is 1,350 square feet with 11,200 cubic feet and an 8¼-foot ceiling height.

Four-inch standard insulation was used in ceiling and walls, none under the floor.

The heating system consists of a total of 17.6 kw in wall type heaters, the size in each room in keeping with the requirements of that area. The heating is thermostatically controlled.

Following are heating and total electric costs for the period April 23, 1954 to April 22, 1955: electric heating, 9,000 kwhr, $116; air conditioning units, 6,000 kwhr, $75; other electrical uses, 22,400 kwhr, $275; total, 37,400 kwhr, $466. (Note: Total kwhr and cost are actual; breakdown is estimated).

The Nelson home is served on a standard urban residential rate. The total electric service averages 1¼ cents, which also is the approximate average kwhr cost for the electric heating and cooling uses.

Major appliances in the home are: range, refrigerator, water heater, freezer, dishwasher, disposal, washing machine, dryer, three 1-ton air conditioners and miscellaneous.

Controlled electric heating increase planned

Alabama Power Company wants the advance of electric heating in its area to be solid, permanent, practical, and for that reason, reasonably controlled. The chief task now is education.

◆ ELECTRIC HEATING has establishd a firm beachhead in Alabama, but the burden of expanding that beachhead thus far has been borne by only a small segment of the electric industry.

The chief task ahead is education. First, the industry itself is being sold on the practical application of electric heating. Second, potential users must be adequately informed to appreciate its value and advantages.

Statistically here's the picture: Six years ago there were fewer than 25 electric heating installations in the Alabama Power Company service area, which constitutes a major portion of the state except for extreme North Alabama, which is served by TVA.

Today there are approximately 1,200 such installations, plus approximately 600 heat pumps. By 1960 the heat pump installation figure is expected to climb past 8,000, and by 1965, past 40,000. Electric heating installations in the same period are expected to equal or exceed those figures.

The man behind the figures is C. Warren Cheatham, Alabama Power's supervisor of heating and air conditioning, who — along with assistant Nelson Eanes — keeps close tab on what's doing in electric heating. The "controlled promotion" of Mr. Cheathams office is chiefly responsible for the firm foothold of electric heating in Alabama.

Controlled growth planned

Despite a consistent annual increase in residential and commercial customers, Alabama Power plans no all-out promotion at this time. Mr. Cheatham's observation is: "We expect to continue promotion on a practical basis. We want a reasonable control of growth in this direction so as to keep our load conditions balanced and to assure that all our customers and potential customers are fully informed on equipment and its proper installation."

Thus far, Alabama Power's program of controlled growth has constituted the strongest impetus to electrical heating in Alabama. A spot check in the Birmingham area disclosed:

1. Very few contractors are "selling" electric heating, apparently because they are not aware of the potential profit and growth. A prime exception is J. B. Stone, whose enthusiastic response was: "Sure, it's really catching on. Five years from now you'll see electric heating in almost all new construction."

2. The city electric inspector's office reported: "Very few electric heating installations are being made."

3. Distributors as a group appeared lukewarm but at least two are getting into the act. Ben Weil, of Mayer Electric Supply Co., reported: "Contractors can be sold on electric heating. We're setting up meetings to discuss it with them." And W. C. Sparks, of Moore-Handley Hardware's electrical department, said: "We already are quite active in electric heating. It is selling well, especially to motels. We find that contractors who have familiarized themselves with it like it."

C. Warren Cheatham, left, supervisor of heating and air conditioning for Alabama Power Co., and Nelson Eanes, his assistant, are playing key roles in the development of electric heating in Alabama.

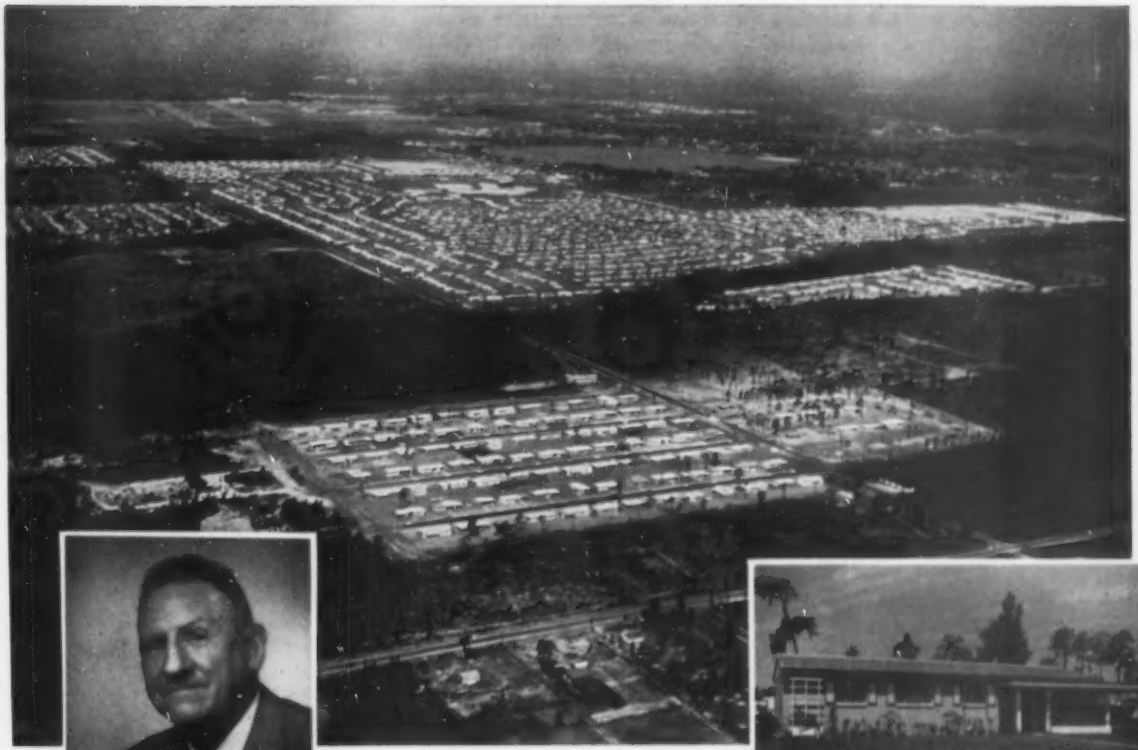
Heat pump promotion

Alabama Power began studying the electric heating question seven years ago, chiefly to determine what effect it would have on company and customer. With the peak distribution load now having shifted from winter to summer because of air conditioning demands, the company has concluded that a controlled increase of electric heating use would help to maintain a balanced load.

Under Mr. Cheatham's direction, the company began a program designed first to inform Alabama Power personnel about the application and general nature of electric heating. This accomplished, meetings were set up in Birmingham which were attended by personnel from the company's six divisions, all segments of the electric heating and heat pump industry. As a result of these meetings,

(Continued on page 130)

CEILHEAT "BOOM" OPENS BIG FLORIDA DEVELOPMENT



Welborn C. Phillips, Sr.
President of Phillips Properties, Central Florida's Largest Homebuilders, Orlando.

"All of the comments that we have heard since we announced the installation of Ceilheat have been highly complimentary. Sales have increased and it appears that they will continue at an increased pace."

CEILHEAT FEATURED PROMOTION BRINGS 3500 VISITORS, $100,000 SALES FIRST DAY

Yes, home-owners *want* and *buy* Ceilheat! Ceilheat Radiant Cable heating is the most important sales feature, of New Azalea Park in Orlando, Florida . . . opened in April by Phillips Properties as the first of two great subdivisions of five to six thousand homes. Hughes Supply Company, Inc., Ceilheat Distributor, says this is one of the most successful subdivision promotions ever attempted in the Southeast. Ceilheat can help you sell homes, too!

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Introduced only a few months ago, Ceilheat's new Wall Insert Heaters are rating high with contractors, distributors and homeowners alike. Complete range of sizes and models. Radically new design projects *more* heat *into room.*

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HEATS LIKE THE SUN

CEILHEAT, INC.

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Circulating heaters prove efficient

This five-room frame house in Opelika, Alabama, is heated with six 9.2 kw Electrend wall-type heating units and is set-up with a separate meter to accurately record heating costs during winter.

◆ WHEN ELECTRICAL heating was installed in his new home in January, 1955, R. J. "Mac" McBurney, superintendent of Light and Power Opelika, Ala., was particularly interested in testing its efficiency and economy. Six 9.2 kw Electrend wall-type heating units were used in the five-room house, and a 15,000 kw unit was installed in the bathroom. For accurate readings, a separate meter was installed solely for the electrical heating system.

Mr. McBurney had the heating units installed and turned on January 26, 1955, while tile was still being laid, carpet put down, and other finishing details being completed. The McBurney's moved in February 12th, and not long after held a one-ween open house during which nearly 500 persons came through to see the electrical heating system.

Monthly heating bill

From January 26, 1955 to January 26, 1956, Mr. McBurney's total heat bill was $56.38 — an average of $4.70 a month. This included the periods of excess use mentioned above. For the seven-month winter season recently completed (October, '55 to April, '56) Mr. McBurney's total power consumption for heating was 4750 kwhr. A breakdown by month was Oct., 166 kwhr; Nov., 390 kwhr; Dec., 985 kwhr; Jan., 1354 kwhr; Feb., 894 kwhr; Mar., 618 kwhr; and Apr., 340 kwhr. At a cost of 1¢ per kwhr this placed Mr. Burney's heating bill at $47.50 or $6.78 for the average monthly cost.

To set the stage for the most efficient use of electrical heat, Mr. McBurney gave particular attention to the insulation of his home. The 900 sq. ft. house has 10-inch pine lap siding, a concrete slab floor, and walls of pine sheathing and sheet rock. In addition to an exterior coating of 15# felt, #2 Alfo aluminum insulation was installed in the sidewalls. All windows and doors are weather-stripped, and 4-inch rock wool batting covers the ceiling.

Like most people who use electrical heating, one of the first advantages cited by Mr. McBurney was cleanliness. None of the soot, dust, and other disadvantages of other types of heating is suffered. Individual room control is beneficial because his grandmother may set a temperature suitable to her comfort in one room, and Mr. McBurney can set another temperature he desires in another room.

Cost of system

The cost of a heating system similar to the one in this home would run around $500, according to Mr. McBurney. This represents around $50 per kilowatt.

Mr. McBurney explained his system was designed for a 10 degree above zero level and for heat loss of 32,000 Btu. Most other systems around Opelika are designed for 15 degrees above zero.

"Experience in the Opelika area has shown that electric heating systems will require from 750 to 800 kwhr for each installed kw, Mr. McBurney explained. "With 9.2 kw units in my home, this means I could use as high as 7360 kwhr during the year. Since I used only 4750 kwhr this indicates that my electrical heating system is more than adequate to handle the heating of the house."

The Electrend units are metal ducts approximately seven feet high, eight inches wide, and three and one-half inches deep. They are mounted between the studding of the wall in each room, and the top grill is covered and painted to blend into the existing color scheme. These units have circulating fans that picks up warm air near the ceiling and re-circulate it through the heating duct. Greater heating efficiency is achieved by re-circulating this preheated air, for the units operate for shorter periods. Each unit has its own thermostat for individual control.

For the seven-month winter season recently completed, the cost for heating this five-room frame house with air circulating type heating units was $47.50 or $6.78 for the average monthly cost. The home was built by R. J. "Mac" McBurney, supt., Light and Power, Opelika, Ala.

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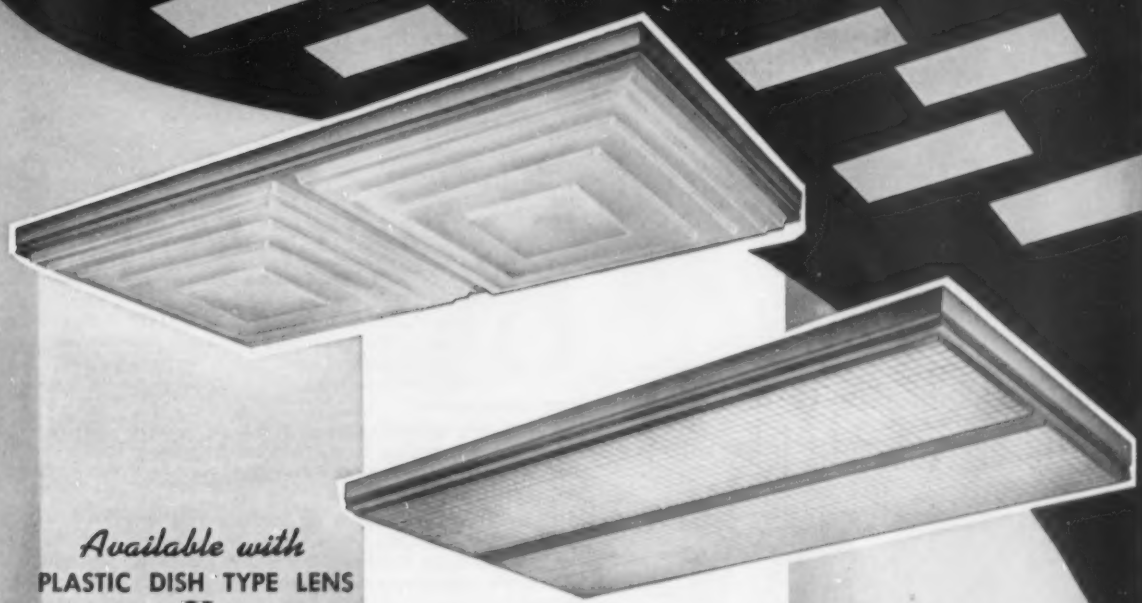

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General Contractors: Ben J. Massell Enterprises
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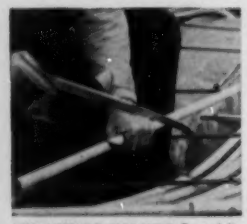
Work-saving features make Republic ELECTRUNITE E.M.T. more economical to install in big concrete jobs

IT'S EASY TO BEND Republic ELECTRUNITE E.M.T. more accurately, thanks to the longitudinal Guide-Line on ½", ¾", 1" and 1¼" sizes. By aligning the "Inch-Marks" and the Guide-Line with calibrations on the Republic Bender, true offset, back-to-back and saddle bends are a cinch to make.



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Nearly 100 miles of Republic ELECTRUNITE® E.M.T. went into those big concrete installations pictured above. And on each job the handy "Guide-Lined" and "Inch-Marked"® features helped electricians stay well ahead of the concrete boys . . . and keep costs down.

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There are no threads to cut, no lines to turn when you use ELECTRUNITE E.M.T. Joining is accomplished by couplings and connectors. To make joints tight, you simply turn the nut, not the entire run. Once installed, still another Republic exclusive—Inside Knurling—makes wire pulling and "fishing" easier.

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Insulation proves economy factor in heating

To prove that proper insulation is the biggest factor in radiant heating, this Arkansas farm electrification advisor shows customers specific case histories comparing heating costs in properly and improperly insulated homes in the area.

Electricians install wire for radiant ceiling heat in a home where the utility company helped to plan the proper insulation.

◆ WITH RADIANT HEATING of small homes gaining fast among the builders of Central Arkansas, Lewis Lemons, farm electrification advisor of the 1st Electrical Cooperative Corp., Jacksonville, is often called upon to show a prospect concrete operation costs. Mr. Lemons responds in two striking ways — with photographs that he takes himself of many installations, and with figures to show what radiant heating costs to install and operate during one complete season.

Interested primarily in proving that just about any builder can afford radiant heating, he starts at the beginning and urges the proper insulation of the dwelling.

Case history method

One of the most convincing arguments he presents for proving the economy of electrical heat in a well-insulated home consists of two case histories. One of these is a neat little brick veneer home of four rooms and bath. The home was well on its way to complete construction before Mr. Lemons stepped in.

The framework stood on the concrete slab that was to be the floor and the subfloor. It was too late for him to argue that the heat loss is much greater when a home is constructed on a concrete slab than when the floors are properly insulated. He did make his successful argument for insulation elsewhere in the house. He told the contractor and the owner that the heat loss coefficient is .202 without proper insulation, and only .100 with it. Outside walls and attic were insulated.

For only $300, the house, on a rural route out of Jacksonville, was equipped with radiant heat. Mr. Lemons worked along with the electricians to make sure that the small ceiling wires were installed correctly, so that the ceiling would act as an electric blanket for the house. He made sure that the thermostats worked perfectly. And he urged cork tile for the floor.

The family was pleased with the result, and to visitors they pointed out the thermostat on the wall that controlled their trouble-free electrical heat that kept the house at an even temperature in the coldest weather. The owner did not even complain about his monthly electrical bills, based on the rate of 1 cent per kwhr. What he does not know is that his house, nameless to prospects who talk to Mr. Lemons about radiant heating, is used on a check list to show the difference between a house not so well insulated and one that meets the standard of an expert in radiant heating insulation.

Cost per room

This second house is a larger one, containing 1,300 square feet of floor space. This, too, is of brick veneer construction. Rooms mean much to Mr. Lemons when he plans radiant heating, because he computes the amount of heat needed for each room. This house has three bedrooms, living room, kitchen-dining room, utility room, and a bath and a half. The walls were insulated with 1-inch insulation board, the ceiling with 3½ inches rock wool batts. The ceiling was plastered. The hardwood floors were laid over a subflooring. The exact wattage used for the $600 job, room by room, was: 2 bedrooms, each 2,700 watts; back bedroom 2,300 watts; hall, 1,000 watts; living room, 4,800 watts; and kitchen-dining room, 4,400 watts. This house, between October and May, 1956, was heated for a total cost of $62.53, at the rate of 1 cent per kwhr. The smaller house, built on its concrete slab, cost about 50 per cent more to heat.

Because the two houses are separated by fifty miles and another county, the owners do not know that they are used for comparison. Mr. Lemons wants to keep the

(Continued on page 133)

Home additions provide heating sales

Home improvements, such as room additions and conversions, have proved a large electric heating market to contractors in the Washington, D. C. area.

◆ A GROWING INTEREST in electric heating in the home has been felt in the outlying Maryland and Virginia suburban areas of metropolitan Washington in recent years, particularly in auxiliary heating, according to contractors and the local power company, among all economic levels of homeowners in both new and existing residences.

Greatest volume of installations has been in porch enclosures, basement and garage conversions to recreation rooms, attic redoing into living space, and room additions, where electric heating proved more flexible, giving more effective coverage at lower installation costs and where an existing heating system might have been overloaded.

The trend in home electric heating will become greatly accelerated, in the opinion of one contractor, when the rate drops to 1.3¢ per kwhr in competition with gas. The feeling is general that electric heat is a cleaner, more evenly distributed heat, more acceptable to living from an appearance and space standpoint, with greater efficiency. Manufacturers now have on the market equipment that is safe, with better temperature controls, and in the form of streamlined baseboard units.

Most effective promotion is carried on by personal contact with customer. The owner company's salesmen talk up electric heating when visiting homeowners on surveys, and in their contacts with builders on new and existing homes. One contractor finds that "one job sells another."

Personal contact sells

While wholesalers have been using sales meetings with contractors for the promotion of electric heating and direct mail by putting manufacturers' literature into accounts receivable statements monthly, contractors emphasize personal contact with the customer as decisive, and direct mail of electric heating folders supplementary. A display of electric heating registers in the local power company's showroom has been instrumental in supplementing contractor effort selling electric heating to prospects. Names are taken, and interest is fololwed up by a call from the local utility company's salesmen.

"Most important in selling customer electric heating is a *realistic* estimate of costs of operation. When sufficient interest has been evoked in the homeowner, our heating engineer is sent in and he prepares a suggestive layout. We recommend insulation, for without proper insulation costs of operation would become prohibitive," said B. F. Shields, supervisor of the Residential Customer Division of the Potomac Electric Power Co., indicating over 100 complete electric home heating installations.

The services of the power company's heating engineer are engaged by contractors in planning heating layouts. A trend toward ceiling heat has become evident in the last 12 months with the introduction of new lines in heating equipment. Recognized as a space saver as well as a source of overhead heat simulating warm sunshine, ceiling heat equipment comprises a simple resistance cable plastered into a ceiling of a home, or cables sandwiched between two sheets of plasterboard. Ceiling heat also provides perfect distribution since every square inch of ceiling becomes heating surface.

"A main sales resistance to overcome is attempting to establish the fact with the customer that heat will radiate downward from the ceiling. Most people remember that heat rises. Since this is radiant

(Continued on page 48)

A one-floor rambler insulated with glass wool where heating costs for an 8-month period came to $337.79 for 19,870 kwh at a 1.7c kwh rate. A rate drop is expected to increase the electric heat trend.

This garage is being converted to a recreation room and following the trend in this area to electric heating cable. Wires are held in place with a grout of cement and sand set the day before.

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There's only one way to be sure that you have a quality water heater—you have to be sure that EVERY part in it is a quality part!

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Carolina plans initial heating campaign

After years of conducting tests and recording data on various electrical heating equipment, Carolina Power and Light Company has announced plans for an extensive, long-range electrical home heating promotion for the fall season.

◆ AN ELECTRIC HEATING promotion campaign for the fall season, based on prospective installation of some 50 residential heat pump installations scattered strategically throughout the company's operating territory in North and South Carolina, is being prepared by Carolina Power and Light Co.

Since the introduction of the heat pump several years ago, little has been heard from the Carolina power firm in the way of active promotion, but not without reason says E. N. Pope, advertising and sales promotion director.

Data recorded

Carolina Power and Light, one southeastern firm usually at or near the top in kilowatt hour gain, is approaching the campaign in an orderly fashion. For several years CP&L salesmen have assisted contractors and dealers in promoting heat pump sales in strategic locations. Most of the installations are sub-metered and performance data has been carefully collected and analyzed through the years with an eye toward compiling a factual dossier on every phase of heat pump application.

The company feels this technique is a prerequisite to the launching of a full scale electric heating campaign.

As expressed by sales manager H. G. Isley, "We take the position that the time spent in conducting heat pump tests is well spent. In the case of the heat pump particularly, mistakes could be expensive. When we have satisfied ourselves on a particular course, we will be in a position to move ahead without having to overcome the resistance which often develops as a result of having moved too fast along an uncharted course."

For the coming campaign, Mr. Pope suggests that additional volume of newspaper advertising and radio spot announcements will spark the company's promotion efforts.

Few, if any, local contractors seem inclined to match CP&L's venture into electric heating promotion. Many apparently are awaiting the outcome of the power company's fact finding survey into electric heating, its performance and adaptability.

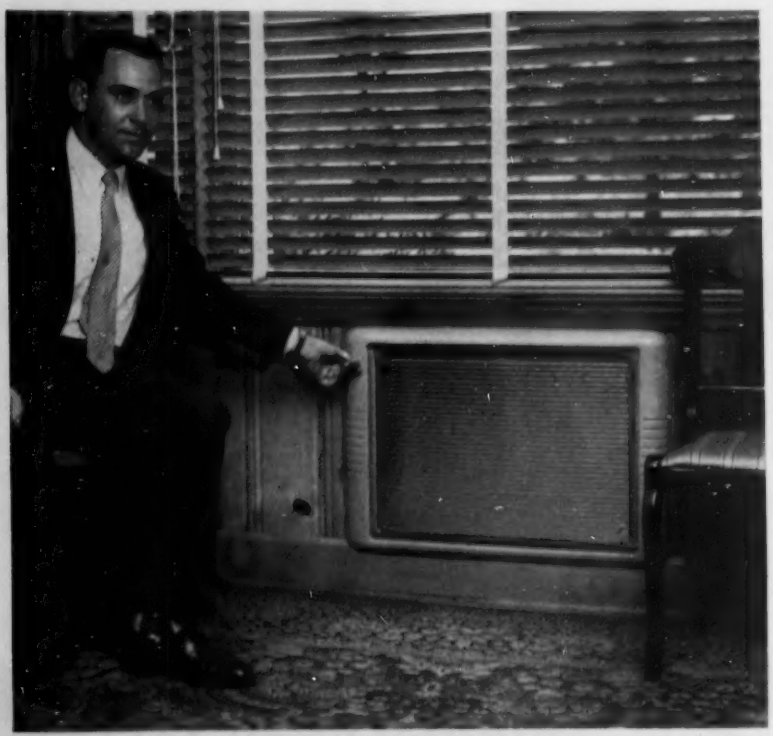
"Package" deal

Of the 15 existing electrically heated homes in the immediate Raleigh area, nearly all were built to the original owners' specifications. A luxury item some call it. And while new construction in the Raleigh area is proceeding energetically, there is no trend toward electric heating installations with the possible exception of home builder C. Griffith's "package" deal.

Mr. Griffith is the builder and promoter of suburban Lake Forest, a 300-home development near Raleigh which will offer at the buyer's option a complete heat pump installation. In the $12,000-$20,000 price range, the proposed new homes will be all electric with most prospects okaying the installation of the popular water-to-air type heat pump.

A pilot home, already opened for public inspection, has attracted thousands of prospective home buyers who were "visibly" impressed with the heat pump according to CP&L salesman Ray Daniels.

CP&L, incidentally, shared publicity and advertising of the new Lake Forest development cooperatively with Mr. Griffith's organization, a kind of prelude to the type of co-operation envisaged by CP&L in the forthcoming heavy promotion of electric home heating.



CP&L salesman Henry Rowland examines a radiant glass panel installed in the dining room of one of four Raleigh homes heated by similar installations. Annual heating costs average $192.

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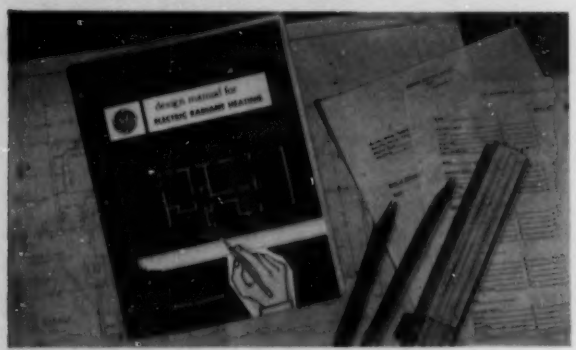
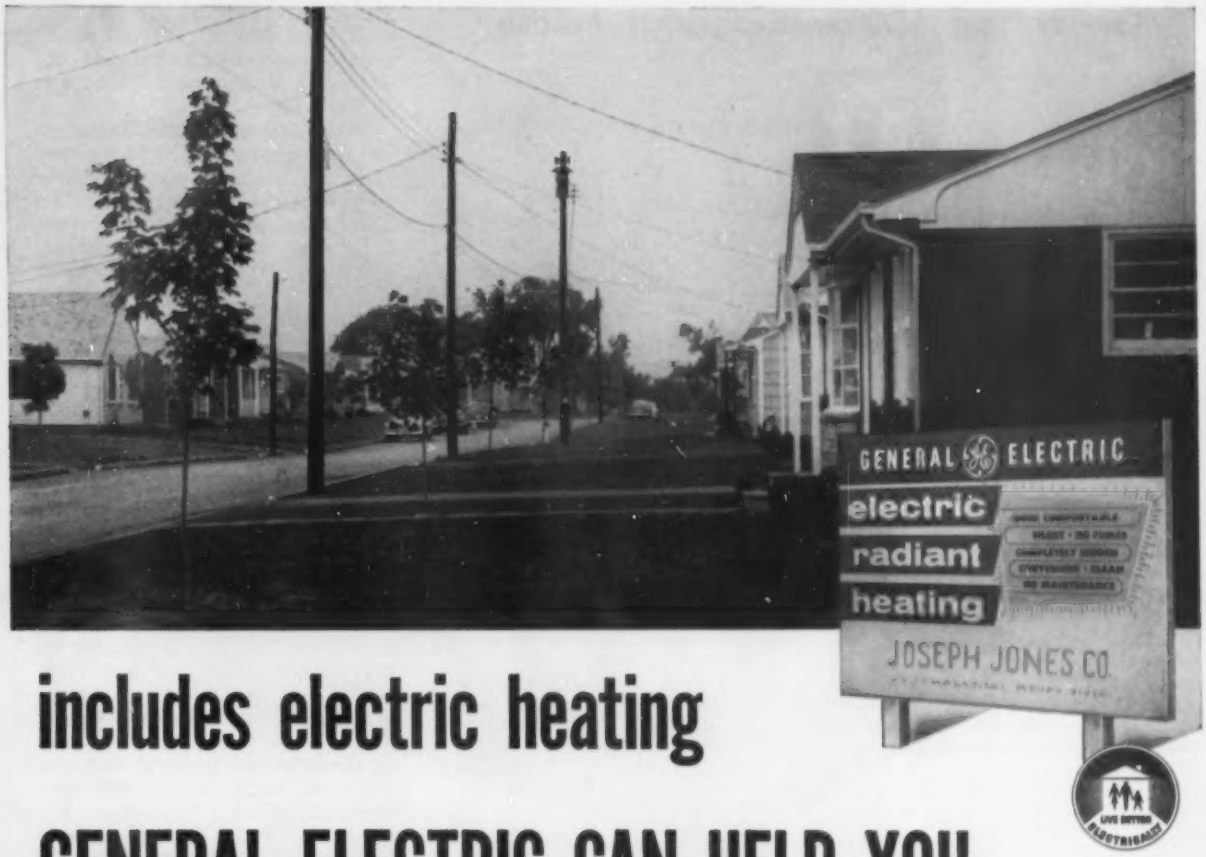


DESIGN MANUAL – As an aid to proper design of electric radiant heating installations, G.E. has prepared step-by-step instructions for calculating heat loss and wiring requirements.

INSTALLATION MANUAL – Complete wiring instructions for contractors, with illustrations, for plaster-embedded and dry-wall applications. Also directions for concrete floor installations.



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For a copy of this Sales Portfolio, or for other information on General Electric radiant panel heating, write to Wiring Device Department, General Electric Company, Providence 7, Rhode Island.

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GENERAL ELECTRIC

Carolina case history in electrical heating

TYPICAL upper - medium - priced bracket, this five-room brick veneer home is door and window weather stripped with storm paper insulation in the walls and sub-flooring. Its 1500 square feet of space is heated by nine 1000 watt glass panels at an annual cost of $198. The heating cost is based on CP&L's residential rate of 1.5¢ per kwhr (after 250 kwhr) per month plus an annual sum of $54 for the nine kw connected heating load.

Washington heating

(Continued from page 42)

energy caused by ceramic material in plaster, the radiant heat is projected downward," said Arthur C. Crawford, heating engineer of the local utility company in Washington.

Baseboard units popular

Other recent equipment that has stimulated electric home heating sales has been a new electric heater in the form of streamline baseboard units and an improvement in a type of control with a two-step thermostat: the first step of the control is designed for one-half the heating unit; the second step for the second half. This type of control will keep maximum demand at a lower value for each house.

All contractors stressed in promoting electric heat in their contact with homeowners the convenience, cleanliness, safety, the individual zone control by thermostat, and even distribution of heat. One contractor indicated that more radiant heat ceramic panels were sold over other types because of lower operation costs with better results and greater safety. Volume has trebled for him in the last three years, and he now has on his boards a plan for heating an entire home by electricity, awaiting only credit approval.

A local wholesaler holds annual sales meetings by counties for contractors, builders and architects on residential electric heating, drawing some 200 persons to hear manufacturer's representatives discuss their products in electric heating. During winter months direct mail is sent out monthly on heating.

Floor cable trend

From an application standpoint, the trend in this area where concrete slab floors in basement and garages converted to comfortable heated rooms presented difficult heating problems has been electric heating cable placed in the concrete slab as it was poured in place. A well for a bulb-type thermostat is installed so that thermostat control can be set to give desired floor temperature.

A one-story rambler-type house (24-ft. wide and 93-ft. long) of three bedrooms, a living room, dining room, bathroom, den and kitchen with laundry equipment, and 23-ft. unheated garage had electric heating equipment installed in March '49. The heating area was 1680 sq. ft., volume of heated space excluding closets 13,000 cu. ft. The connected load was 17,300 watts.

With walls of cinderblock shaped to the appearance of weather boarding, the house has a suspended floor over a cross-base. The floor is made of insulating concrete over metal reenforcement, and covered with wood parquet flooring. There is 6-inches of glass wool insulation in the ceiling. The interior is finished with wood paneling covering 2-in. fur strips and 4-in. glass insulation behind the paneling. All windows were either thermopane or storm-enclosed.

With rates in this area 1.7¢ per kwhr when a bill exceeds $6.85 a month, the operating cost of heating the rambler for the period Oct. 6, '55 through May 31, '56 came to $337.79 for 19,870 kwhr at the rate of 1.7¢. The kwhr for the other electric appliances and lighting was 7189. The number of degree days during this period was 4559.

"We believe that the day is coming when electric heating in the home in one form or another will be the expected thing. It may entail some change in building construction before it becomes an accomplished fact," said Mr. Shields of the local utility company. "If the builder approached residential construction for electric heating instead of conventional heating, he would have a very acceptable house, a home recognized by the public as more livable, cleaner, with lowered operating costs, and with greater efficiency with ducts put in the right places during construction, than he has hitherto known."

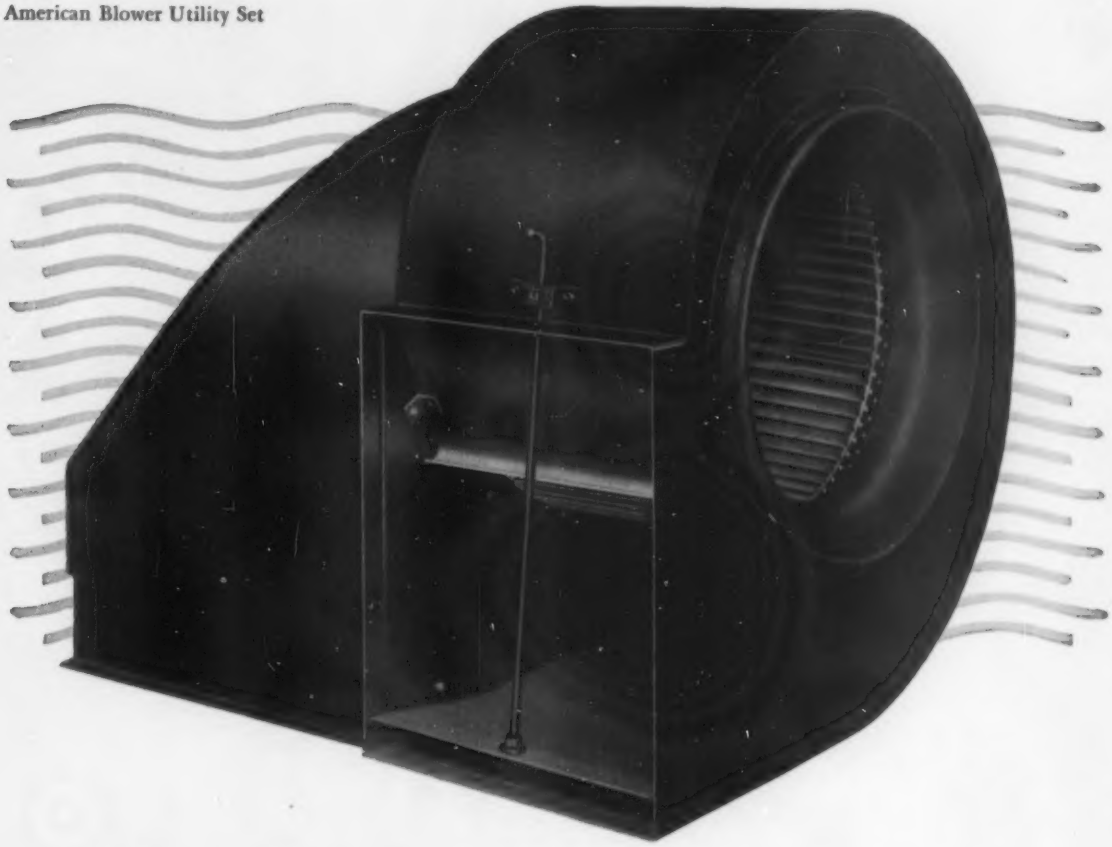
Contractors, however, believe a lowered rate per kwhr that would bring electricity in competition with gas would be the determining factor in bringing about increased residential electric heating in this area.

Heat pumps in Texas

(Continued from page 29)

almost double that of 1955 in the Western Louisiana and East Texas area. One of the big reasons for this is the complete cooperation between contractor, wholesaler, and utility salesmen. They have worked out a plan where the contractor gets a lead, and the wholesaler and utility salesmen use the different sales tools to sell the prospective customer on electrical heating. This cooperation has really payed off.

American Blower Utility Set



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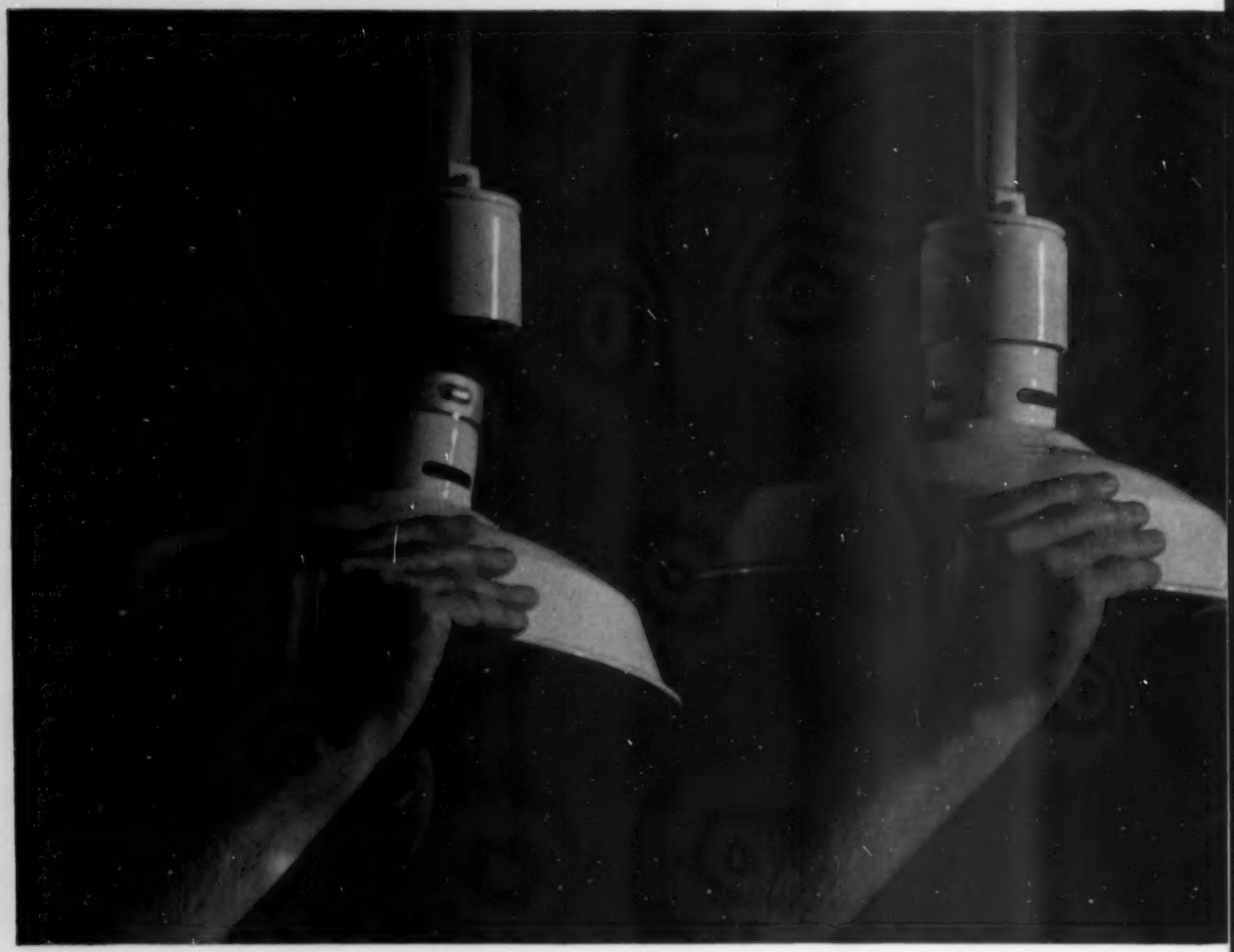

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Contractors--IBEW discuss mutual

For the fifteenth consecutive year management and labor in the electrical contracting industry have met together in the Southwest to discuss their mutual problems. Frankness on both sides has probably been responsible for the success of these meetings. For example, this year labor tells NECA to remove membership restrictions and NECA representatives discuss worker productivity.

◆ BOTH CONTRACTORS and local unions need more members to enable them to discharge their obligation to society and take advantage of all the construction and rewiring work available, spokesmen for both organizations admonished the most singular management-labor conference known to industry the world over and held this year in Galveston, Texas.

It was the fifteenth annual joint meeting of members of the National Electrical Contractors Association, District 5, with members of the International Brotherhood of Electrical Workers, District 7.

It attracted in excess of 350 people, not counting children who came along for water sports, but including a large number of wives. And as usual the convention featured joint social activities as well as business discussions, the latter both jointly and separately.

Midway of the convention, delegates were informed that under certain conditions, a ceiling is no longer a ceiling — it is a "luminous diffusing system," which makes it an installation for the electrical contractor.

Industry leaders speak

Delegates heard, also, from two of the top men of this industry — Oliver F. Burnett, Jr., national president of the contractors' organization and Gordon M. Freeman, international president of electrical workers.

It was these two who referred most pointedly to the need of additional members and although there was no mention of specific steps to increase NECA membership, President Freeman, who spoke following Burnett, commented that "I suppose we have to take the lead in this connection." He added that although he didn't mean for IBEW to "pick up members off the streets, I do mean that IBEW must remove some of its restrictions."

In Burnett's opening remarks he said this was his sixth district meeting as president and his first experience with the unusual joint meeting in the Southwest. He said he "had had some doubts as to its value (the joint meeting), but these are rapidly passing away." He continued:

"NECA and IBEW have built this industry to the point you find it today and without the IBEW contract we would not have the position we have in industry. But IBEW needs NECA, too. Now, let's see where we go from here.

"We are not opposing forces, we are all in the same boat pulling oars together. NECA and IBEW are the two strongest forces in industry and they need to be, for in the next ten years we will probably have the most challenging period in history.

"America is underbuilt. In the residential field we need homes for 800,000 families. We lose through fire, flood and obsolescence, 12 to 15,000,000 homes annually. Nine millions of families move and create the need for better housing every year. We are underbuilt in the commercial and industrial fields, too. And we are also underbuilt in the field of worship — the churches.

"Nevertheless, we are in what I refer to as a paradox of plenty. We have plenty of people, plenty of work and plenty of money. But we in this industry do not have enough contractors to do the job. We are guilty of the sin of restricting memberships in both NECA and IBEW.

"In this paradox of plenty, many contractors will go broke during the next ten years. Why?

"Because we haven't learned to make a profit. We are giving away our work and putting in bids which cannot make a profit. But, of course, it is always the other contractor who is making low-cost bids. Not us.

"Any man who does not make a profit is of no value to anyone."

President Freeman also commented on the joint meeting, saying, "this is my first joint meeting and I am beginning to learn a few things I already knew.

"We are in critical times and I would be remiss if I did not state to this group the items that confront us.

"A program of work promotion is now in effect, sponsored by a group of manufacturers and NECA and in a large Eastern city a utility asked contractors to register if they were interested in this program. Of the 300 contractors who registered, not one was an employer of IBEW.

"I ask members of both organizations to seriously consider this situation. We are all falling down on the job when not a single NECA member shows an interest in this work.

"I want this group to know that NECA has always responded to our requests, all of which have been made in interest of the industry. However, it is good for industry to be able to have people criticize our operations so, while I must necessarily criticize the representatives of NECA (if I didn't they might think IBEW is beginning to get soft), I want to offer a little solution.

Remove restrictions

"It is unfortunate that NECA does not have the authority to put progress into effect, so I suppose we have to take the lead in this connection, in the only way it effects our own organization. IBEW should accept qualified mechanics as members. I don't mean to pick them up off the streets, but I do mean that IBEW must remove some of its restrictions. This is not to be taken in the way of a threat. To me, it is a matter of good business.

"I suggest to NECA that they likewise accept qualified contrac-

problems

tors into their organization. Working together in this, we can accomplish the ends we desire. And that's the solution I offer to the situation we find ourselves in today.

"If I can make our people realize — I mean all of us in the contracting business, not just IBEW — then my remarks will have accomplished their purpose.

"In conclusion, I want to congratulate those responsible for this joint meeting."

Both Burnett and Freeman spoke in a session at which A. E. (Art) Edwards, international vice president of District 7, IBEW, presided as chairman. And in the concluding session both ranking officers were presented with Texas hats by Charles Scholibo, manager of the Southwest Texas (Houston) chapter of NECA, host for the meeting.

Previously, Harold J. Hill, vice-president of District 5, NECA, and of the Hill Electric Co., of Wichita, Kan., had reviewed for the convention the origin of the joint meeting, the equal of which is not seen elsewhere in industry, he pointed out.

"There has been so much com-

Gordon M. Freeman, IBEW president; Oliver F. Burnett, Jr., NECA president; Harold J. Hill, vice president District 5, NECA; A. E. Edwards, vice president District 7, IBEW; Joe Keenan, international secretary, IBEW, at 15th annual joint meeting.

Harold J. Hill, vice president District 5, NECA, and chairman of the day; E. R. Cornish, NECA director of research and education; Bill Damon, director, national Joint Apprenticeship and Training Committee; George A. Seaman, field director, District 5, NECA.

Panel on "Housepower." A. R. Johnson, IBEW Local No. 324, Longview, Texas; Paul M. Geary, executive vice president, NECA; George A. Seaman, field director, District 5, NECA; J. W. Null, international representative, IBEW, Fort Worth; W. Ernest Butcher, Butcher Electrical Service, Dallas; E. R. Cornish, NECA director of research and education. Mr. Seaman was moderator for the panel discussion.

ment about our joint meeting and so much interest in it and what it accomplishes," Hill said, "that we thought the factors should be reviewed here.

History of meeting

"Originally, it grew from an idea of George Seaman (field director, District 5, NECA), and the first joint meeting was called to order in the fall of 1943 in Fort Worth, Texas, and the next spring there was a similar meeting in Oklahoma City.

"At the outset it was planned to hold the meeting twice a year, but by 1946 it was realized that two meetings a year were too many and the arrangement was revised to provide for only one meeting a year. However, it has grown in duration from one to four days and it has been held in all the principal cities of the Southwest, including El Paso.

"No other district has such a meeting, although one or two have tried it, without success. At one time there was a movement to abandon this joint meeting, but this did not prevail in the voting, which was 97 to 3 for continuing."

Speaking on the same program with Hill, Burnett and Freeman, another international officer, secretary of IBEW, also from the Washington office, told the convention:

"As long as we are able to hold these meetings under these conditions, our industry is in good shape. Our organization represents all branches of the industry, but we haven't been able to develop elsewhere, the understanding we enjoy in the contracting field.

"There are a number of concerns here in Texas fighting the general contractors. And the right-to-work laws have the same effect, wherever they are in effect. They take away from us certain police powers. I am deeply concerned about what can happen if the right-to-work fellows have their way.

"Meanwhile, there is an attempt in a subtle way to destroy the labor unions of this country. If you know your history you will remember that in every country in the last 20 years where totalitarianism moved in, the first thing done was destroy the trade unions.

"We have to work together. When you, the contractors, are in trouble, it is up to us to get behind you. And when the shoe is on the other foot, you can't afford to walk away.

"Trade unions are more responsible for our way of life than any other group. And the thing that's going to continue that way of life is meetings just like this one."

With Vice-President Hill presiding as chairman over the second joint session, Bill Damon, director of the National Joint Apprenticeship and Training Committee for the electrical industry made his annual report. He is well known to members of both groups in the Southwest since he was previously NECA chapter manager in Oklahoma City.

Apprenticeship report

"This industry is in many ways the envy of the whole industrial empire," Damon said, "for no other branch does so many things together as NECA and IBEW. The U. S. Department of Labor points to this, the contracting field, as an example to follow, but it has taken us 60 years to reach the position we now enjoy.

"Apprenticeship is our most important single activity, for the first requirement of the industry is extremely well-trained mechanics and in this particular we are doing an outstanding job.

"There are 680 contractor members of NECA in this area and these chapters and locals have been asked to include in all labor agreements, a clause setting up a joint committee on apprenticeship, with a full-time director responsible to the committee.

"We also hope to establish technical libraries in every local, for during the war we had crews that did not have time for technical training and even now we need schooling for journeymen who have been out of apprenticeship for five years or more. They especially need training in industrial electronics."

E. R. Cornish, director of research and education for NECA, told the convention that work force productivity must be expanded.

"It can be done more quickly," he specified, "by increasing the productivity through better job management."

He then showed, with comment, a series of colored slides illustrating better management practices.

The assistant to the international president of IBEW — Frank Graham — observed with satisfaction that there are not too many jurisdictional disputes "in this area." But, he added:

"Another problem is to prevent labor unions from destroying themselves and that could come about through jurisdictional disputes. A steward on the job, to work with the foreman, is highly important because he is informed on jurisdictional matters. We are not insisting on a full-time steward, but it should be realized that a steward is highly important to the contractor."

It was Graham who introduced the ceiling as "a luminous diffusing system" adding, "and we think the contractor should put that in."

George Roscoe, director of governmental affairs for NECA, was unable to attend and deliver his assigned report on legislation, but his place on the program was filled by Field Director Seaman, who concerned himself entirely with Senate Bill 1644, ranked as of top importance to the industry.

Seaman said he was able to report that the full judiciary committee of the U. S. Senate had voted out the bill favorably to the rules committee and that at that time the bill had also been favorably reported by the House judiciary committee.

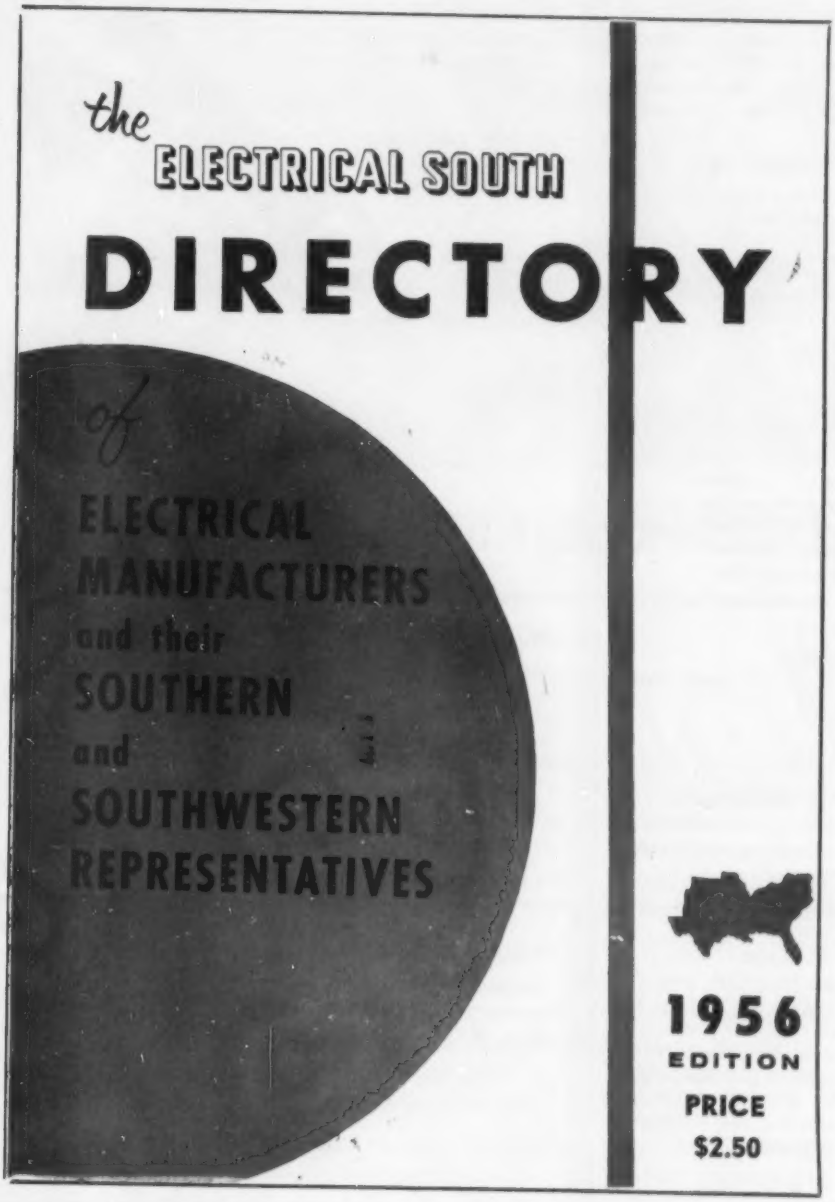
Council members present

Two members of the council on industrial relations for the electrical contracting industry were present to report and answer questions. One is T. J. Ryan, business manager for Local 302, Richmond, Calif., and the other is E. R. Edenfield, contractor-owner of the Edenfield Electric, Inc., Nashville.

Ryan reported that up to then the council, meeting four times a year in February, May, August and November, had heard and decided a total of 407 cases. The council was established 36 years ago, in 1920, and in the first 27 years heard only 47 cases. However, in the past nine years, the total of cases heard has been 360. All decisions must be unanimous.

Edenfield explained in more detail how personnel of the council is selected because of experience with labor, but emphasized that all members, whether representing NECA or IBEW, forget such affiliations in considering a dispute. He related some time-wasting cases brought before the council and pleaded with his audience to bring facts when a case is involved. Asking for questions and getting none, he expressed surprise, but was informed from the audience that Scholibo, Houston chapter manager and member of the council, "keeps us informed down here on what's going on."

THIS IS BRAND NEW!



Now, for the first time, a special Directory for the use of the Southern and Southwestern electrical trade has been published by ELECTRICAL SOUTH.

In compiling this Directory, we have endeavored to furnish the most complete listing possible of all electrical manufacturers in alphabetical order together with their Southern and Southwestern representatives.

For convenience, a number of manufacturers have included cross - reference advertising on their products. This extra service will help locate special facts and specifications and other pertinent product data. So far as we know, this is the first Directory of its kind ever published for the Southern electrical trade.

Enthusiastic letters from Directory users confirm earlier survey reports stressing need for this type of information. The supply is limited . . . order your copy now.

Please send me the *new* ELECTRICAL SOUTH Directory; my check for $2.50 is enclosed.

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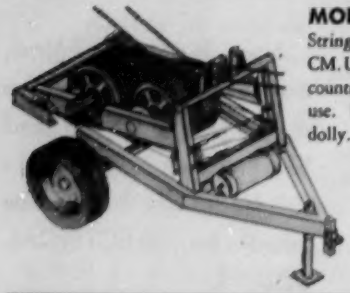
Partial showing of the now ***COMPLETE*** line of . . .

PENGO TENSION WIRE STRINGING EQUIPMENT

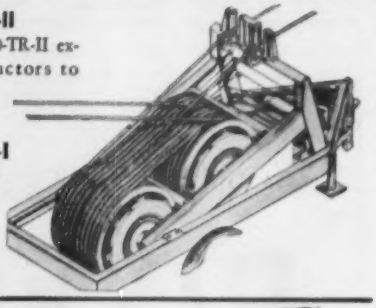


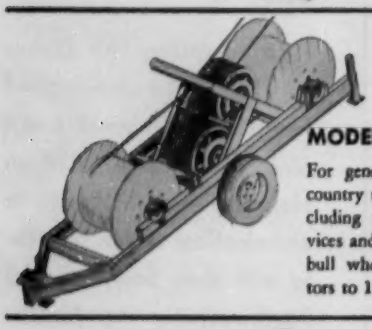
MODEL 5000-TR-II
Strings two conductors to 556,300 CM. Used primarily for very rough country work; also for general use. Use separate reel-carrying dolly.

MODEL 5000-TR-I
Similar except strings one conductor.

MODEL 6000-TR-II
Similar to Model 5000-TR-II except larger. Conductors to 1,272,000 CM.

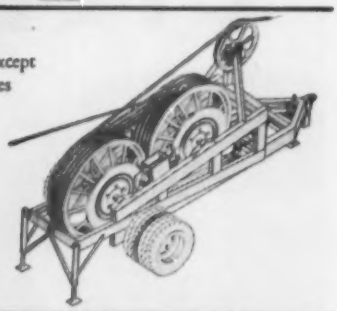
MODEL 6000-TR-I
Similar except for one conductor.

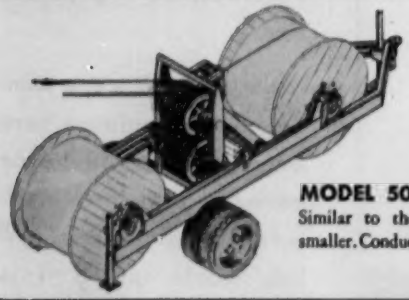




MODEL 6000-WS-TR
For general and medium rough country use. A complete unit including trailer, reel-carrying devices and its own double pair of bull wheels. Conductors to 1,272,000 CM.

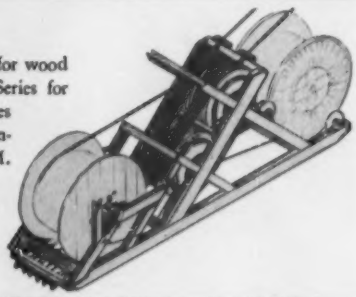
MODEL 7000-TR-I
Similar to model 6000-TR-I except larger. Conductors to 2 inches diameter.

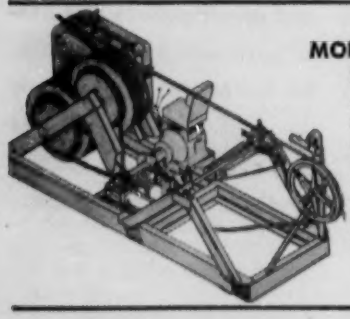




MODEL 5000-WS-TR
Similar to the 6000-WS-TR but smaller. Conductors to 556,300 CM.

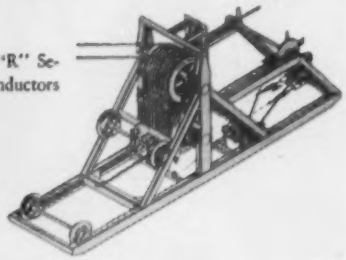
MODEL 6000-W
Available in "S" Series for wood or steel reels, in "R" Series for steel reels, or "SR" Series for trailer mounting. Conductors to 1,272,000 CM.

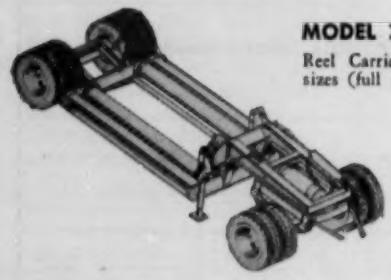




MODEL 6500
Bull Wheel Cable Puller. Available in "R" Series for steel reels, "S" Series for wood reels. Conductors to 1,272,000 CM. Also available in "LWR" Model for extra-large steel reels. Model 5500 similar (smaller).

MODEL 5000-SR
Available in "S" Series, "R" Series, or "SR" Series. Conductors to 556,300 CM.





MODEL 7500
Reel Carrier. Takes the largest sizes (full range) of steel reels. Loads and unloads with one man. No auxiliary equipment needed except the truck that pulls it. For use with any one of the tensioning machines shown on this page.

ADDITIONAL MODELS NOT SHOWN

Tension Reel Trailers

MODELS 2, 3, and 4, Two-Wheel Straddle Dollies not shown. For use with any one of the tensioning machines shown on these pages.

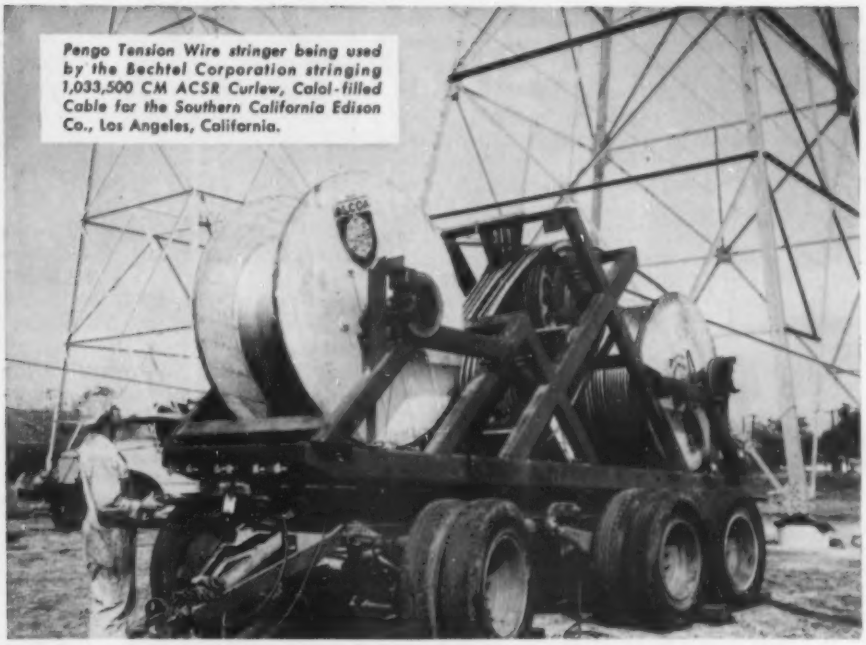
Tension Stringers

MODELS 6000-SK-I and 6000-SK-II For one or two conductors to 1,272,000 CM. Skid mounted for installation on owner's equipment.

MODELS 5000-SK-I and 5000-SK-II Skid mounted for installing on owner's equipment. For stringing one or two conductors to 556,300 CM.

MODEL 5000-WS-III Strings three conductors to 556,300 CM. For mounting on low-bed or full trailer.

MODEL 6000-WS-III Strings three conductors to 1,272,000 CM. For mounting on low-bed or full trailer.



Pengo Tension Wire stringer being used by the Bechtel Corporation stringing 1,033,500 CM ACSR Curlew, Cotol-filled Cable for the Southern California Edison Co., Los Angeles, California.

The latest method of stringing conductors

- ***Safest, most economical for transmission, distribution and even secondary lines.***
- ***Its greatest savings are effected when stringing over and through energized circuits... by far the safest, too!***

Operation of the PENGO Tension Wire Stringer is almost unbelievably smooth. Because the tensioning is done on the Neoprene-Lined Bullwheels rather than on reels, conductor damage from the reels has been eliminated entirely. Due to the Neoprene lining of the Bullwheels, it is possible to use a full range of wire sizes to maximum groove capacity, which, in the case of the Model 6000-WS shown in picture, is Pheasant or 1⅜" diameter.

SMOOTH, POSITIVE CONTROL OF CONDUCTOR TENSION can be maintained at all times regardless of model or size of PENGO Tension Wire Stringer used. The large, specially designed PENGO disc brakes are mounted away from the Bullwheels to assure dissipation of the heat generated by the continuous braking action and prevent transmission of the heat to the Bullwheels.

In addition to the model shown in the picture, all series are available in low-slung trailer mounts for mountain work with separate easy-loading reel trailers.

List your requirements and send for descriptive literature and prices.

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Santa Clara, California Dept. 19

Please send me more information on the new Pengo Tension Wire Stringer.

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PETERSEN
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Other PENGO Products include:

24 inch Heavy Duty Flight Auger

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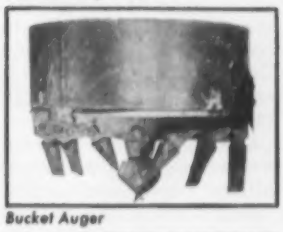
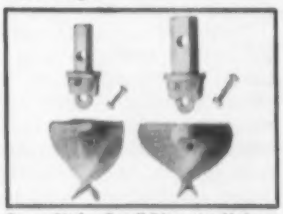
Offset Boring Head

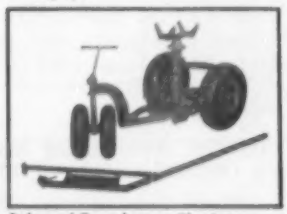


Bucket Auger



Screw Bit for Small Diameter Holes

Pulling Eye



Pole and Transformer Chariot

The industry promotion referred to in his address by International President Freeman of IBEW, which attracted no NECA contractors in the unnamed Eastern city, was fully exploited before the convention by Seaman, who showed a film and a long series of colored slides to illustrate the vast volume of work that is available in the house modernization and other fields, but is generally untouched by contractors.

Seaman commented that although he had toured his territory and worked it diligently, he had a limited amount of success in interesting contractors. He pointed out, however, that on the next day's program there would appear one contractor who has

(Continued on page 124)

Code interpretations clarify wiring rules

◆ A NEW OFFICIAL interpretation and a new tentative interim amendment to the National Electrical Code have been released by the National Fire Protection Association, it was announced by Charles L. Smith, electrical field engineer of the NFPA and secretary of the National Electrical Code Committee. The interpretation and amendment are in addition to the official interpretations and amendments of the 1953 Code previously released.

Tentative interim amendment No. 105 introduces into the National Electrical Code the term "Dust-Ignition-Proof" as it may relate to electrical installations where arcs, sparks, or heat otherwise generated or liberated might cause ignition of nearby accumulations or atmospheric suspensions of a specific dust. This amendment will be incorporated in the 1956 edition of the National Electrical Code which is scheduled for publication by the National Fire Protection Association in September and will also be published by the NFPA in Volume V of the 1956 National Fire Codes.

Interpretation No. 432 deals with seals for raceways in aircraft hangar installations and applies to both the 1953 and 1956 editions.

The text of the two interim provisions is as follows:

Interim Amendment No. 105 (Effective June 8, 1956)

Introducing the term "Dust-Ignition-Proof" into the text of Article 500 in appropriate Sections.

5051. General. Add a second paragraph to the 1953 edition of the National Electrical Code as follows:

"Dust-Ignition-Proof, as used in this Article, shall mean enclosed in a manner which will exclude ignitable amounts of dusts or amounts which might affect performance or rating, and which, when installation and protection are in conformance with this Code, will not permit arcs, sparks, or heat otherwise generated or liberated inside of the enclosure, to cause ignition of exterior accumulations or atmospheric suspensions of a specified dust on or in the vicinity of the enclosure;" also;

5054-a-1. After "shall be" in the eighth line, insert "dust-ignition-proof and;"

5055. Sealing, Class II, Divisions 1 and 2. Change first sentence to read "Where a raceway provides communication between an enclosure which is required to be dust-ignition-proof and one which is not, suitable means shall be provided to prevent the entrance of dust into the dust-ignition-proof enclosure through the raceway." (Remainder of paragraph to be unchanged)

5056-a-1. Before "enclosures" in the last line, insert "dust-ignition-proof."

5057-a. Before "enclosures" in the fourth line, insert "dust-ignition-proof."

5057-b-3. Before "enclosures" in the second line, insert "dust-ignition-proof."

5058-a. After "approved" in the fifth line, insert "as dust-ignition-proof."

5060-a. After "shall be" in the third line, insert "dust-ignition-proof and."

5060-b-2. After "shall be" in the first line, insert "dust-ignition-proof and."

5061-a-1. After "shall be" in the first line, insert "dust-ignition-proof and."

5061-b-1. After "shall be" in the first line, insert "dust-ignition-proof and."

5063-a. After "approved" in the fourth line, insert "as dust-ignition-proof."

5064-a-3. Before "enclosures" in the last line, insert "dust-ignition-proof."

Interpretation No. 432 (Effective June 8, 1956)

Section 5015; seals required in raceways for hangar building installations.

Statement: A hangar building consists of a hangar area and two adjoining areas cut off from the hangar area with eight inch cement block walls. Fire doors cut off the openings between the hangar areas and the adjacent areas. Panelboards are installed in the adjacent areas more than 18 inches above the concrete floors. Runs of conduit go under a 10 inch concrete floor in the hangar area and connect panelboards in the adjacent areas. The adjacent areas are considered Class I, Division 2 areas for a distance of 18 inches above the floors. Two lengths of conduit are joined by threaded couplings made up tight within this 18 inch distance from the floor in one of the adjacent areas.

Question No. 1—Under the conditions just given must seals, as covered in Section 5015, be used at each end of the conduit runs in the adjacent areas before they enter the panelboards?

Answer—Yes.

Question No. 2—If under the first condition seals are considered necessary, would they still be necessary if the conduit couplings that are now threaded and made up tight were welded?

Answer—Yes.

Question No. 3—Was it the intent of the Panel that seals, as described in Section 5015, be required in each conduit run where the conduit is encased in four inches of concrete in addition to being run under a one foot thick concrete hangar floor?

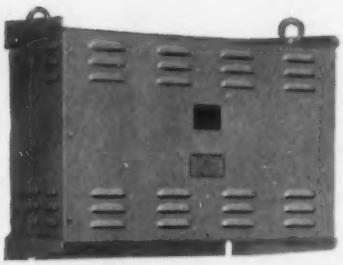
Answer—Yes.

TRANSFORMERS

To change higher voltage distribution service to lower voltage lighting and power circuits

SORGEL *Dry-Type* TRANSFORMERS

are the most practical type for indoor installations



15 to 50 Kva 3-phase wall mounting type

Requiring no oil or liquid, they can be installed in almost any convenient place inside of buildings, without fire-proof vaults or other enclosures, and meet the requirements of the National Electrical Code. This eliminates the necessity of long runs of secondary feeders and reduces installation and wiring costs.

SORGEL transformers can be installed at load centers, using higher voltage feeders, requiring smaller copper, increasing efficiency, improving voltage regulation and reducing losses. They require no maintenance or further attention after installation.

Easy installation, easy connecting, rugged construction.

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QUIET OPERATION

The sound level is well below the established standards. Because of their quiet operation, SORGEL transformers are particularly adaptable for indoor installations close to load centers, and where low sound levels are an important factor.

TYPICAL APPLICATIONS

Sorgel dry-type transformers are used to:

Operate 120 volt lighting and portable equipment from 240, 480 or 600 volt power circuits.

Change odd voltages to standard voltage. Phase changing.

For high voltage interior distribution systems of 2400, 4160, 4800, 7200, 13,200 and up to 15,000 volts.

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¼ Kva to 2500 Kva single phase.
1 Kva to 3000 Kva 3-phase, 2-phase, and phase changing.
All standard voltages, such as 120, 208, 240, 480, 600, 2400, 4160, 4800, 7200, 13,200 and up to 15,000 volts, and any intermediate or special lower voltage.

Also Special Transformers and Saturable Reactors

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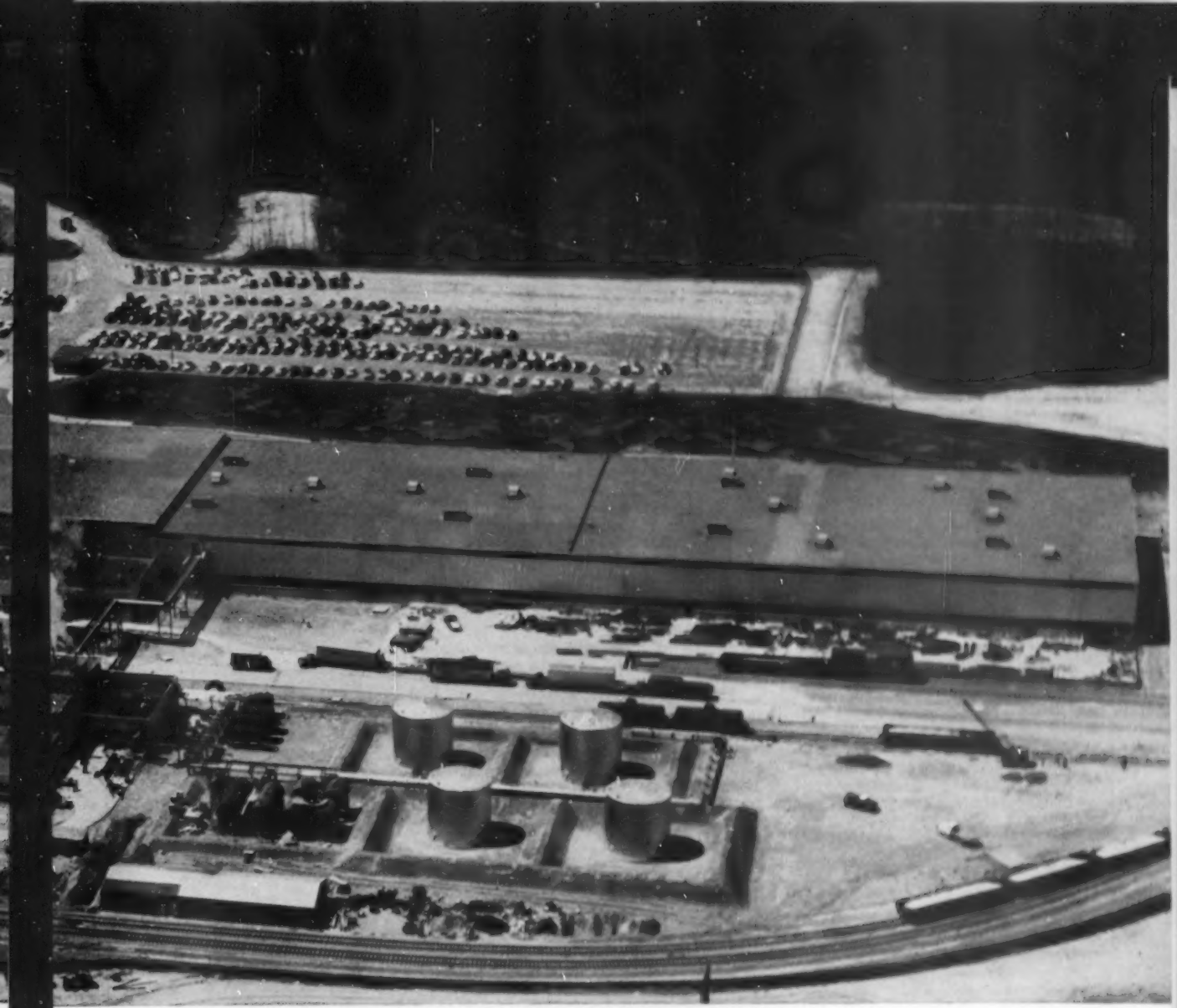

Electric Transformer Plant

A progress report on construction at Hickory, N. C.

Early in 1955, ground was broken for a new General Electric distribution transformer plant near Hickory, N. C. Major construction has now been finished and machinery is being installed. Limited production has already gotten under way.

With the increase of industrialization and construction in the South, there is a greater demand for electrical distribution equipment from utility and industrial users. By locating this plant in the South, General Electric will be able to provide even better service on distribution transformers to Southern customers.

Eventually about 1000 people from the Hickory-Newton-Conover area will be employed at the new plant. This will be the second major transformer plant General Electric will have operating in the South. A Medium Transformer Plant was opened in Rome, Georgia, in May, 1954. Both of these plants are General Electric's answer to the booming electrical industry in the South. General Electric Company, Schenectady 5, N. Y. 451-47

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New, revised estimating tables continued in this issue

A NEW SERIES of estimating tables, completely revised in the light of more recent jobs and experience, are presented in this issue and will appear from month to month in forthcoming issues. These electrical estimating data sheets cover labor only and are arranged alphabetically with the basic material headings as a title for each tabulation.

Labor units given in these tabulations are based on a minimum of interference during work progress. The averages listed do not provide for abnormal job conditions, and any such abnormal conditions will require adjustments by the user, based on his experience.

The work units covered by each table are composed of one or more separate but closely related operations necessary for the complete installation of a particular basic item of electrical equipment. These operations associated with the basic material are described at the bottom of each table.

Most of the electrical estimating tabulations follow the same form. Column 1 at the left shows the size of the material to be installed. The second column from the left gives the time required to install the material, and it should be noted especially that this "productivity" column may be based on individual units or in the case of cable or conduit on units of 100 feet or 1,000 feet. The abbreviations "Ea." for each, "C" for hundreds, and "M" for thousands in Column 2 indicate the basis of the labor hours.

Columns 3 to 13, from the left, give the actual labor costs in dollars per unit of installation, at various hourly wage rates.

When calculations are being made for an hourly wage rate that doesn't correspond to any of the rates listed in Columns 3 to 13, the user may multiply the number of hours in Column 2 by 100 and this will give the labor cost based on an hourly wage rate of $1 per hour. By multiplying this by the hourly wage rate that actually applies in the user's locality, the exact labor cost of the operation may be obtained. Labor costs obtained in this way will be for units, hundreds of feet, etc., as given in heading of Column 2 of the table.

The labor units covered by the tables represent direct job labor costs and do not include delivery of material to site, engineering, estimating, or any other indirect cost.

As will be noted, some of the electrical estimating tabulations to be given will be for independent operations, such as excavating, backfilling, etc. These are included for use in preparing estimates on work of a special nature not covered under a specific table heading.

Tables will appear in alphabetical order.

BOXES & MISCL. OUTLETS
MOUNTED ON "WOOD"
NEW WORK

ITEM	HOURS EACH	LABOR COST EACH AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
					CLG. OUTLETS							
3½" Octg.	.35	.438	.525	.613	.70	.788	.875	.963	1.05	1.13	1.23	1.31
4" Octg.	.4	.50	.60	.70	.80	.90	1.00	1.10	1.20	1.30	1.40	1.50
4" Sq.	.45	.563	.675	.788	.90	1.01	1.13	1.24	1.35	1.46	1.58	1.69
3½ x 1½"	.3	.375	.45	.525	.60	.675	.75	.825	.90	.975	1.05	1.12
3½ x 3/4"	.35	.438	.525	.613	.70	.788	.875	.963	1.05	1.13	1.23	1.31
4" Comb.	.4	.50	.60	.70	.80	.90	1.00	1.10	1.20	1.30	1.40	1.50
					BRACKET LIGHTS							
3½" Octg.	.3	.375	.45	.525	.60	.675	.75	.825	.90	.975	1.05	1.12
4" Octg.	.35	.438	.525	.613	.70	.788	.875	.963	1.05	1.13	1.23	1.31
4" Sq.	.4	.50	.60	.70	.80	.90	1.00	1.10	1.20	1.30	1.40	1.50
Handy	.25	.313	.375	.438	.50	.563	.625	.688	.75	.813	.875	.938
4" Comb.	.35	.438	.525	.613	.70	.788	.875	.963	1.05	1.13	1.23	1.31
					EXTENSION RINGS							
3½ Octg.	.15	.188	.225	.263	.30	.338	.375	.413	.45	.488	.525	.563
4" Octg.	.2	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75
4" Sq.	.2	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75
4 11/16"	.25	.313	.375	.438	.50	.563	.625	.688	.75	.813	.875	.938
					DUPLEX REC. OUTLETS							
4" Sq.	.35	.438	.525	.613	.70	.788	.875	.963	1.05	1.13	1.23	1.31
4 11/16"	.45	.563	.675	.788	.90	1.01	1.13	1.24	1.35	1.46	1.58	1.69
4" x 2" Thru Box.	.45	.563	.675	.788	.90	1.01	1.13	1.24	1.35	1.46	1.58	1.69

E-101-B

NOTE: LABOR INCLUDES DRILLING, MOUNTING, MAKEUP OF BOX, COMPLETE READY FOR TRIM.

8-56

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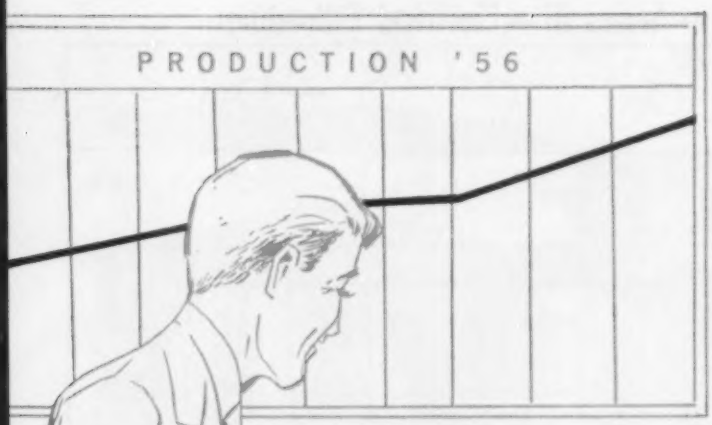

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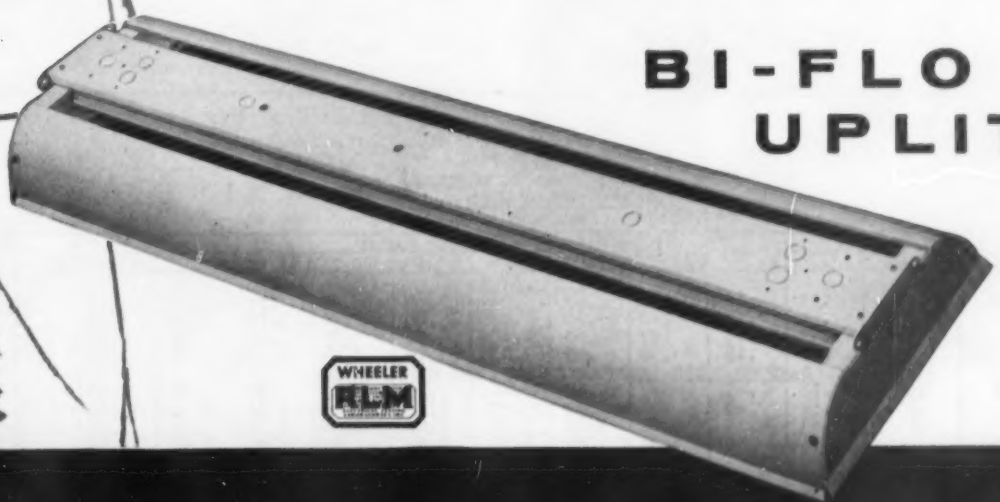

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NEW WORK "EXPOSED"

ITEM	HOURS EACH	LABOR COST EACH AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
					CLG. OUTLETS							
3 ½" Octg.	.42	.53	.63	.74	.84	.95	1.05	1.16	1.26	1.37	1.47	1.58
4" Octg.	.5	.63	.75	.88	1.00	1.13	1.25	1.38	1.50	1.63	1.75	1.88
4" Sq.	.55	.69	.83	.96	1.10	1.24	1.38	1.51	1.65	1.79	1.93	2.06
3½" x 1"	.4	.50	.60	.70	.80	.90	1.00	1.10	1.20	1.30	1.40	1.50
3½" x 3/4"	.45	.56	.68	.79	.90	1.01	1.13	1.24	1.35	1.46	1.58	1.69
					BRACKET LIGHTS							
3½" Octg.	.4	.50	.60	.70	.80	.90	1.00	1.10	1.20	1.30	1.40	1.50
4" Octg.	.45	.56	.68	.79	.90	1.01	1.13	1.24	1.35	1.46	1.58	1.69
4" Sq.	.5	.63	.75	.88	1.00	1.13	1.25	1.38	1.50	1.63	1.75	1.88
3½" x 1"	.35	.44	.53	.61	.70	.79	.88	.96	1.05	1.14	1.23	1.31
4" Comb.	.4	.50	.60	.70	.80	.90	1.00	1.10	1.20	1.30	1.40	1.50
					EXTENSION RINGS							
3½" Octg.	.15	.19	.23	.26	.30	.34	.38	.41	.45	.49	.53	.56
4" Octg.	.2	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75
4" Sq.	.2	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75
4 11/16"	.25	.31	.38	.44	.50	.56	.63	.69	.75	.81	.88	.94
					DUPLEX REC. OUTLETS							
4" Sq.	.35	.44	.53	.61	.70	.79	.87	.96	1.05	1.14	1.23	1.31
4 11/16"	.55	.69	.83	.96	1.10	1.24	1.38	1.51	1.65	1.79	1.93	2.06

E-101-B

NOTE: ALL MASONRY DRILLING BY ELECTRIC DRILL. LABOR INCLUDES INSTALLATION COMPLETE, AND MAKE UP READY FOR BUT NOT INCLUDING TRIM.

8-56

BOXES AND MISCL. OUTLETS
MOUNTED ON WOOD
NEW WORK

ITEM	HOURS EACH	LABOR COST EACH AT FOLLOWING RATES										
		$1.25	$1.50	$1.75	$2.00	$2.25	$2.50	$2.75	$3.00	$3.25	$3.50	$3.75
					SWITCH BOXES							
Handy	.25	.31	.38	.44	.50	.56	.63	.69	.75	.81	.88	.94
4" Sq.	.35	.44	.53	.61	.70	.79	.88	.96	1.05	1.14	1.23	1.31
3"x2"Cable	.3	.38	.45	.53	.60	.68	.75	.83	.90	.98	1.05	1.13
4"x2" THRU	.45	.56	.68	.79	.90	1.01	1.13	1.24	1.35	1.46	1.58	1.69
					GANG Sw BOXES (REGULAR DEPTH), AND METAL COVERS							
2 Gang	.3	.38	.45	.53	.60	.68	.75	.83	.90	.98	1.05	1.13
3 "	.4	.50	.60	.70	.80	.90	1.00	1.10	1.20	1.30	1.40	1.50
4 "	.5	.63	.75	.88	1.00	1.13	1.25	1.38	1.50	1.63	1.75	1.88
5 "	.6	.75	.90	1.05	1.20	1.30	1.50	1.65	1.80	1.95	2.10	2.25
6 Gang	.7	.88	1.05	1.23	1.40	1.58	1.75	1.93	2.10	2.28	2.45	2.63
7 "	.8	1.00	1.20	1.40	1.60	1.80	2.00	2.20	2.40	2.60	2.80	3.00
8 "	.9	1.13	1.35	1.58	1.80	2.03	2.25	2.48	2.70	2.93	3.15	3.38
9 "	1.0	1.25	1.50	1.75	2.00	2.25	2.50	2.75	3.00	3.25	3.50	3.75
					BOX COVERS AND TRIM							
BLANK	.1	.125	.15	.175	.20	.225	.25	.275	.30	.325	.35	.375
OPEN	.1	.125	.15	.175	.20	.225	.25	.275	.30	.325	.35	.375
Cd. Drop	.2	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75
Sgl. Fish.	.15	.188	.225	.263	.30	.338	.375	.413	.45	.488	.525	.563
Dpl. Fish.	.2	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75
					TRIM (INSTALLING DEVICE AND COVER ONLY)							
S.P. Sw.	.2	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75
3.W. Sw.	.4	.50	.60	.70	.80	.90	1.00	1.10	1.20	1.30	1.40	1.50
4.W. Sw.	.5	.63	.75	.88	1.00	1.13	1.25	1.38	1.50	1.63	1.75	1.88
Dupl. Rec.	.2	.25	.30	.35	.40	.45	.50	.55	.60	.65	.70	.75

E-101-B

NOTE: LABOR INCLUDES INSTALLING AND MAKE UP COMPLETE OR AS INDICATED.

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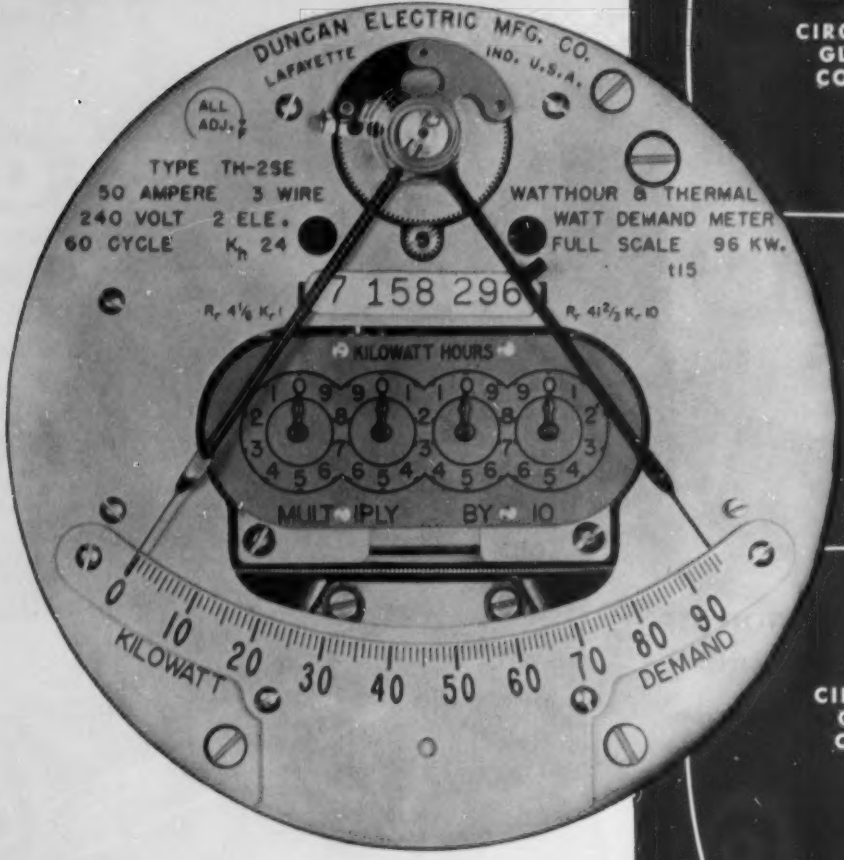

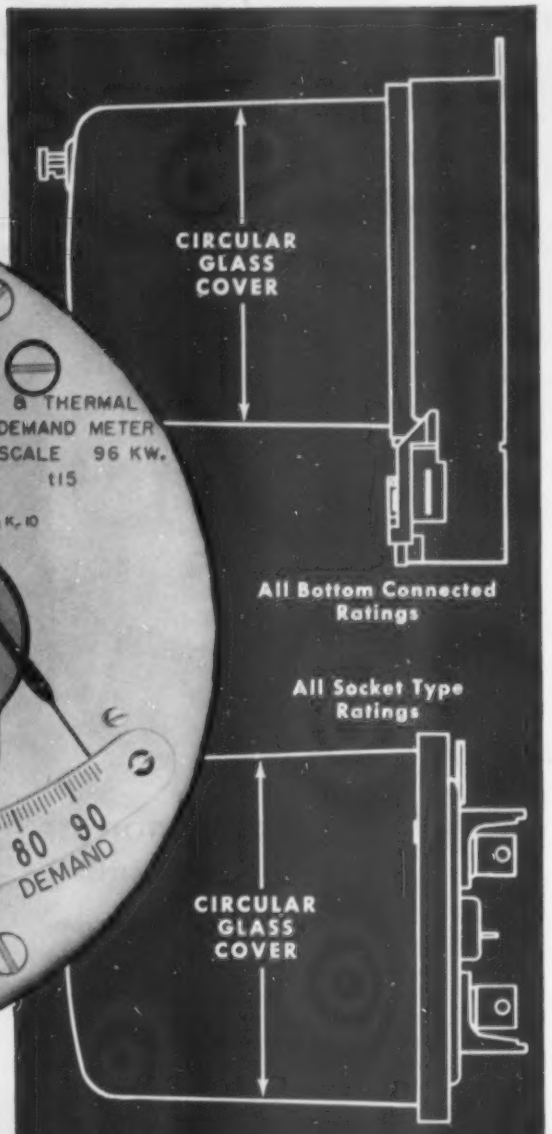

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2. Available in all types and ratings—3- or 4-wire.

3. Built in "extended range" ratings—self-contained capacity to 200 Amps.

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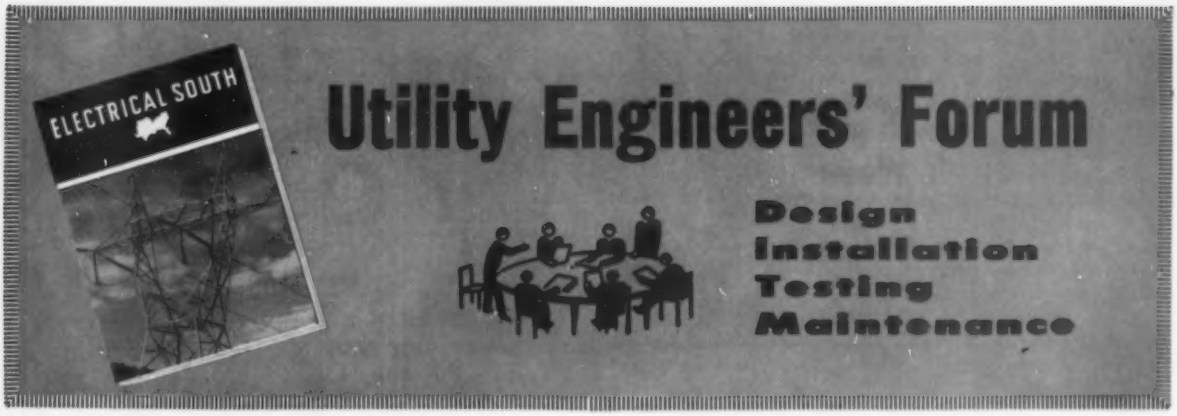

Differential relay installation problems

Differential relay schemes may look relatively simple in diagram form but there are a great many problems that may be encountered in the actual installation in the field. Here is practical information and test procedures that will enable the field relay engineer to avoid some dangerous pitfalls.

By L. R. Butt, Regional Relay Supervisor, Florida Power and Light Co., Miami, Florida.

◆ AS POWER SYSTEMS expand, and loads increase, larger and more expensive equipment is placed in service. As this larger equipment goes in service, considerably more thought is given to its protection than has been in the past. In some cases, fuses will be used for protection but most generally the protection will be some form of differential relaying. Differential relaying is by no means new, but many more applications are being made today than have been in the past.

When differential relays are included in an installation from the planning stage, the actual installation of the relays is usually far more simple than it is when differential relaying is applied to a station that has grown from a one or two distribution breaker station to a combination transmission and distribution station of major size. It is toward the field problems rather than the engineering problems encountered in this type of installation that this paper is intended, although the problems may be similar to those encountered in new stations.

It has been our experience that we can install differential relays with a minimum amount of difficulty if we began at the current transformers. Beginning at the current transformers means a complete test of each transformer involved, including a ratio, excitation, and polarity test. If the transformers are located in power transformer bushings, a ratio test is not made, because at this time, we have not found a satisfactory method to make this test.

Begin check at CT's

All connections are carefully checked, particularly delta connections. As you know, there are several ways to connect current transformers in a delta, but there is only one correct way for a particular installation. We insist that the delta connection be checked against the nameplate of the power transformer involved.

On the Florida Power & Light Company system, more misoperations of differential relays have occurred because of some type of an error at the current transformers than from any other place or point in the differential scheme. These errors have ranged from incorrect connections to missing jumpers in the delta connection and shorting links left in the current transformer terminal blocks.

At the present time current transformer terminal blocks have not been standardized by the manufacturers. Some of them are equipped with short-circuiting facilities and some are not. At some stage of an installation it is usually necessary to short-circuit a set of current transformers. Terminals without short-circuiting facilities present a rather dangerous problem if the current transformers must be shorted while the equipment is in service.

Multiple ground hazard

If the current transformers have been in service before, a particularly thoroughly check must be made for multiple grounds. Multiple grounds may cause the secondary circuit to have impressed across it any difference in potential which might occur between the two grounding points. The difference even in well-grounded stations can still be in the order of several hundred volts under fault conditions.

Recommended practice is to connect the neutral points of all current transformers in an interconnected group to a common bus and ground this bus at only one point. A more or less stardard practice is to ground current transformers used for line relaying or metering at the breaker or source, and to ground a differential circuit at only one point— the switchboard.

Such a system lends itself to an accurate visual inspection of connections, particularly in cir-

cuit breakers. It also permits a simple test for multiple grounds. The one ground lead can be disconnected and the entire current circuit "Meggered" to determine the presence or absence of other grounds.

Some of these multiple grounds may be the result of our own safety programs, because utilities usually attempt to impress on new employees the importance of grounding current transformer secondaries. Multiple grounds on differential circuits have actually occurred because men not familiar with differential circuits have placed grounds on current transformers after being instructed that all current transformer secondaries should be grounded.

This is a hazard that is present not only during installation, but at all times, especially when there are new men in the field.

Where current transformer secondaries must be paralleled, as is usual in a good many installations, it is good practice to provide connections that permit easy separation of the leads. If this is not done, difficulty may be experienced at a later date when checking for trouble, modifying the scheme, or adding and removing equipment to or from the overall differential scheme.

Test links valuable aid

If some type of test link which permits current measurement can be located in each current transformer lead at some point before the parallel connection is made many current transformer errors such as reversed polarity or incorrect ratios can easily be detected. Such a test link can be invaluable at a later date when trouble is experienced, because it permits a quick check of current transformers without removing any equipment from service.

Such a test link arrangement does not require an abnormal amount of space, but the actual physical point of paralleling may present certain installation problems. It is good practice to provide some type of junction box for paralleling if the secondaries are to be paralleled at a point remote from the switchboard. If the paralleling is done at the switchboard, there may be space limitations which will present a problem.

Before a differential scheme is placed in service the trip circuit must be thoroughly tested to determine that the relay trips the proper breakers. A differential relay usually trips a hand-reset auxiliary relay which in turn is provided with as many contacts as are necessary to trip all circuits connected to the scheme. If the hand-reset auxiliary relay is provided with extra contacts, additions to the scheme at a later date are greatly facilitated.

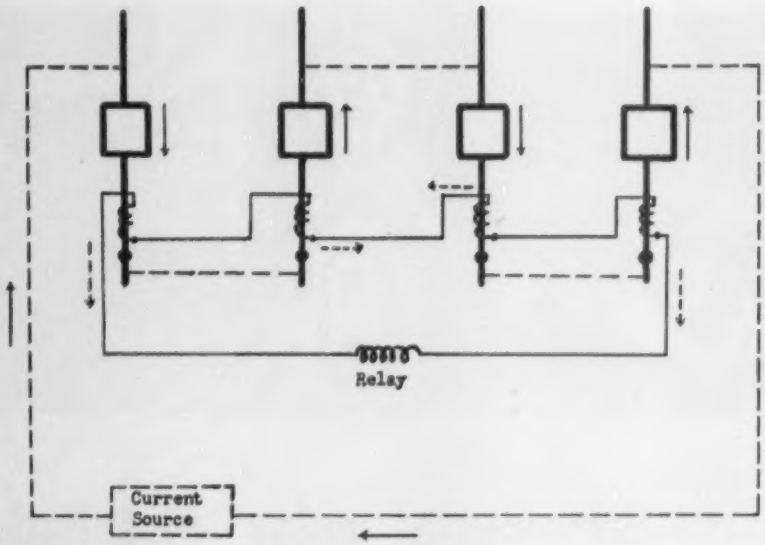

Figure 1—The arrows indicate relative instantaneous polarities. If all connections are correct, zero voltage appears across the relay coil. One of the principal advantages of this type test is that the primary current can be quickly and easily reversed in each breaker to check the performance of the current transformer or linear coupler under test.

In many cases, operating conditions will not permit simultaneous tripping of all breakers connected to a particular scheme. Disconnecting all trip circuits except one is a practical method of testing tripping. After the circuit has been tripped, the trip circuit can be disconnected and the next trip circuit connected until all breakers involved have been tripped by the hand-reset relay.

Caution must be exercised in reconnecting all trip circuits after such a test is made. If test links are provided between the hand-reset relay and the trip circuits, it is not necessary to remove any leads to make this test. A number of recent installations on the Florida Power & Light Company system have included test links between the hand-reset auxiliary relay and the trip circuits. These links have proved very practical and have been well received by the men in the field. The absence of such links makes periodic testing rather hazardous if tripping is considered a part of the test.

Load condition tests

Once a differential scheme has been installed, it must be tested under load conditions. If the relay is a current relay, a phase angle meter is an indispensable tool for a final test of connections and current transformers. In some types of two-restraint differential relays without taps, a test can be made with only an ammeter, but good practice dictates a current and phase angle test on all current type differential relays.

Some types of differential relays with taps have a large amount of current in the operating coil under normal load conditions. The interpretation of the results obtained with the phase angle meter and other instruments must be made immediately if the scheme is to be placed in service, and caution must be exercised that meter polarities are observed when the test connections are made.

Differential voltage type relays are commonly tested with a high impedance voltmeter connected to read the voltage across the operating coil of the relay. If all connections are correct and the current transformers are performing properly, the voltage will be very small, or perhaps zero, depending on the characteristics of the current transformers. A zero reading

(Continued on page 126)

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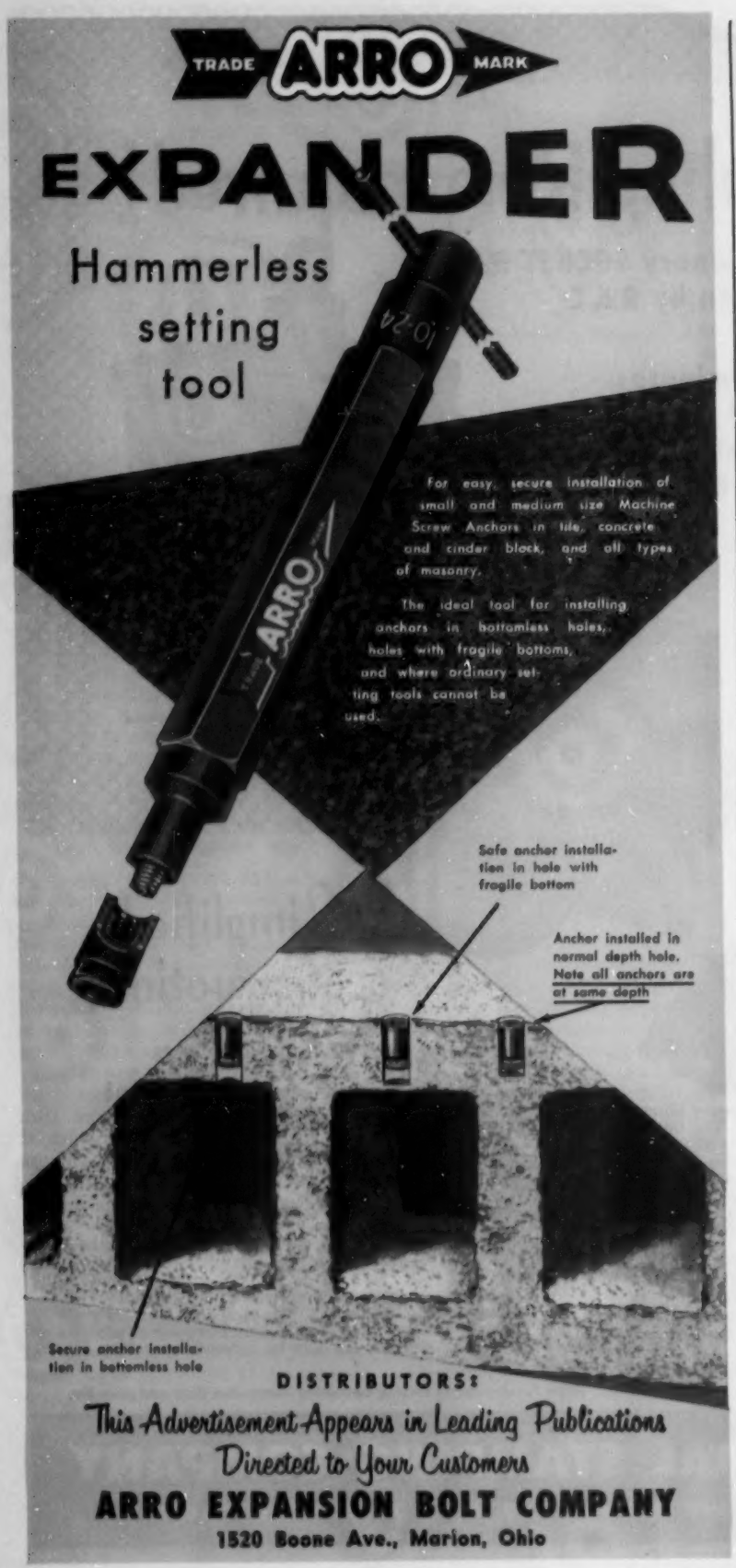
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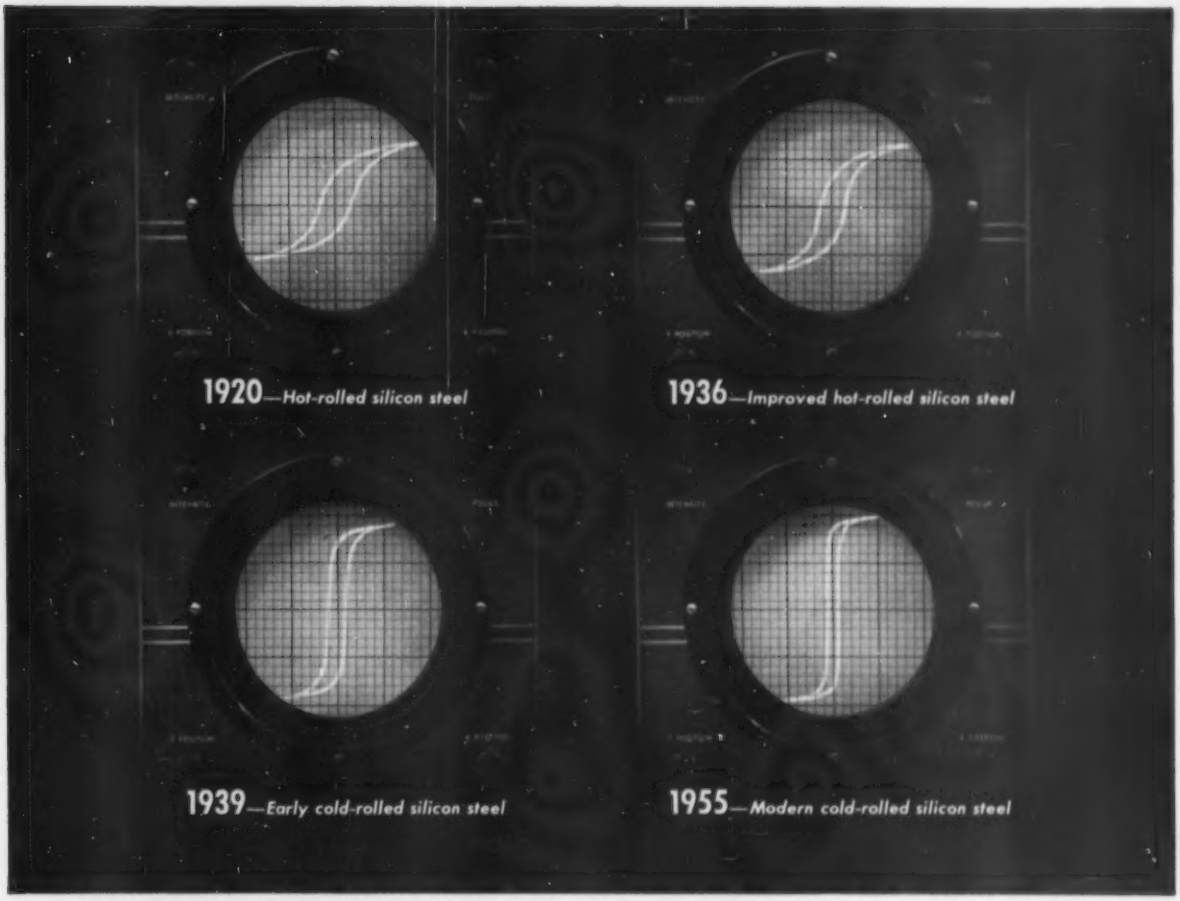

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Switched distribution capacitors

In this era of rapidly growing distribution line loads, the switched capacitor has proved tremendously helpful to many utility companies. The distribution engineer who applies them, however, is faced with the problems of where to place the switched capacitors on the distribution feeder for greatest loss reduction benefits and what type of control to use for switching the capacitor banks. This article examines both these problems in considerable detail.

By N. M. Neagle, Capacitor Department Specialist, General Electric Co., Hudson Falls, N. Y.

◆ SYSTEM LOAD flow studies such as made on an a-c network analyzer are frequently used to determine the economic flow of kilovars over a power system. These board studies normally only include that portion of the system down to the substation secondary bus.

System capacitor requirements are thus located on the substation bus, but it is the job of the distribution engineer to place the capacitors out in the distribution area to make the most of the capacitor investment.

There are several ways to look at this problem, and this article outlines: (1) Where the switched capacitors belong on the distribution feeder based on loss savings, and (2) What type of controls are available for the switching of the capacitor banks.

Location of capacitors

Exactly where the capacitors should be installed on the distribution feeder based on loss savings can be derived by placing a primary feeder in the terms as shown in Figure 1.

Assume a primary feeder has an evenly distributed load from its source to the end of the feeder. Divide the feeder's length into per cent, with 0% at the feedpoint or substation, and 100% at the end of the feeder. Call the peak reactive load at the source end 100%. Halfway along the feeder the reactive load is 50%, and at the end of the feeder the reactive load is 0%. One more factor is to rate the capacitor bank in terms of per cent of total reactive load. For example, if a feeder has 600 kilovars at peak load, and a capacitor bank of 300 kilovars is to be placed on this feeder, call the capacitor bank rating 50% (300/600 x 100%).

With these factors in mind, consider placing this capacitor bank of 50% rating at various positions (per cent distance) along the feeder length. The objective is to obtain the maximum loss reduction on this feeder by the correct location of the 50% capacitor bank.

Obviously if the capacitor bank was located at the source end, the bank would not cause any loss reduction on the primary feeder. (Of course, loss reduction would be made back in the system.) But, as shown in Figure 2, by steadily moving this capacitor bank out on the feeder until the 75% distance from the source is reached, the capacitor bank continues to make an ever increasing amount of loss reduction. After the 75% location point is reached, moving the capacitor further along the feeder will increase the total losses.

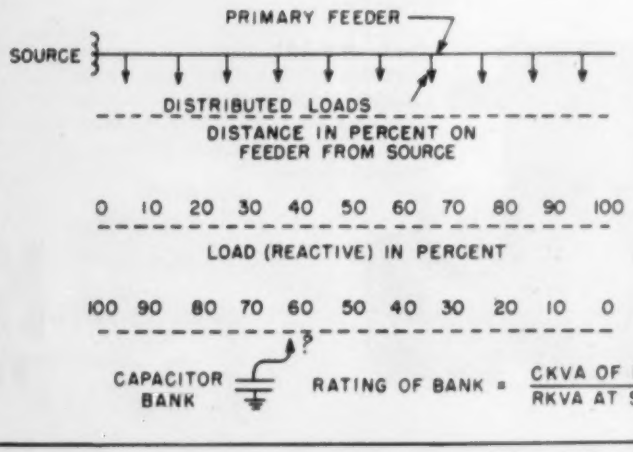
At the 75% point, about 84% of the total peak losses caused by the reactive current have been saved by the 50% capacitor bank. If this bank were placed at the end of the line, 75% of the losses due to the reactive current would have been saved.

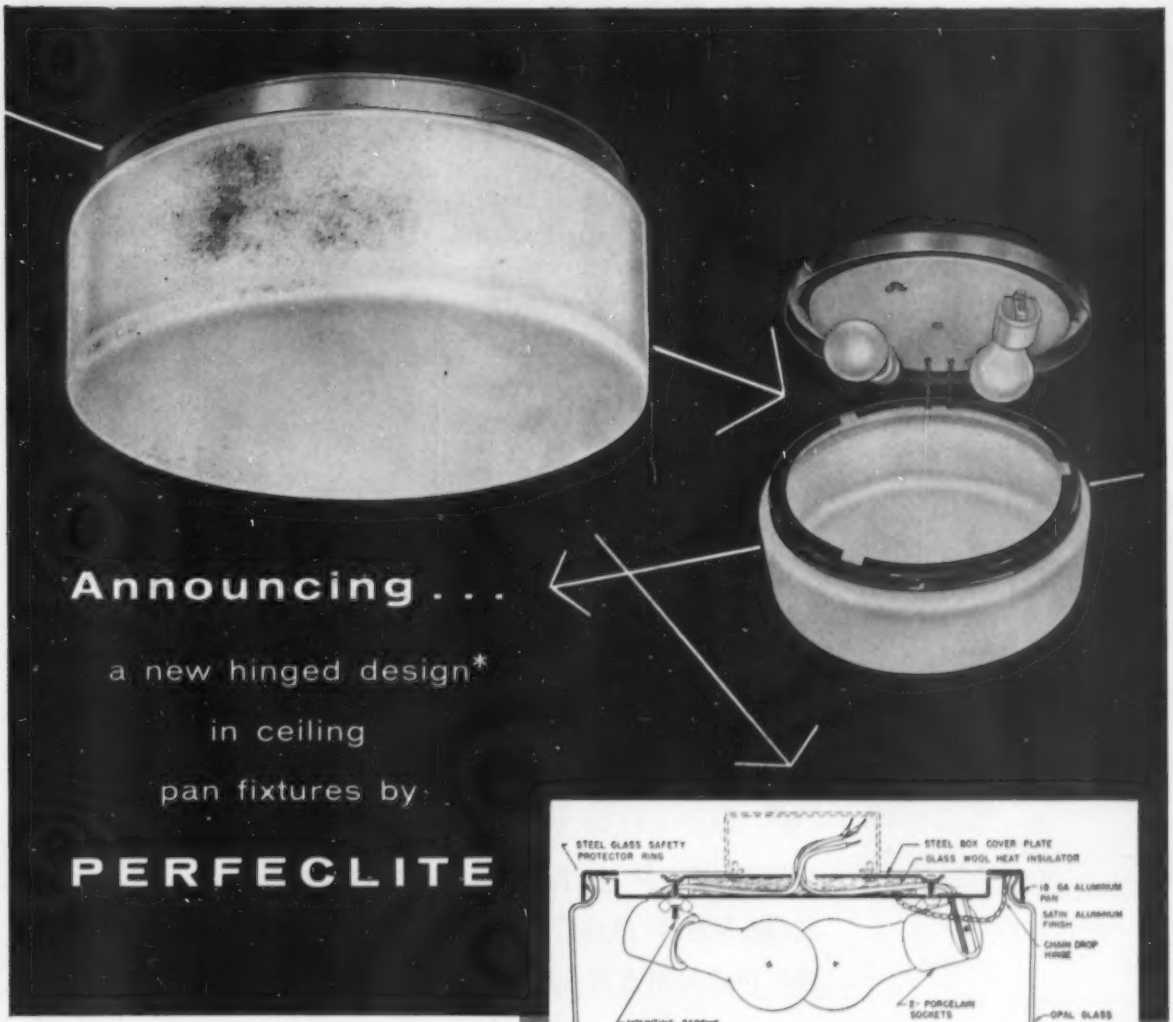
Losses effectively reduced

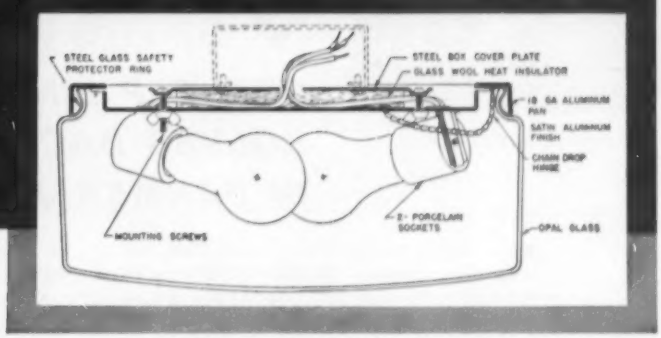
This illustrates the fact that to obtain the most loss reduction for a given capacitor bank on a feeder, the capacitor bank must be located at the correct location. Figure 3 shows the correct location for any size of capacitor bank. This figure also indicates the per cent of losses due to reactive load remaining when the capacitor bank is located at its most economical loss reduction location.

A simple rule can be developed to correctly locate a given capacitor bank on a distribution feeder to obtain greatest loss reduction

FIGURE 1
DEFINITION OF TERMS USED TO DESCRIBE A PRIMARY FEEDER


PRIMARY FEEDER
SOURCE
DISTRIBUTED LOADS
DISTANCE IN PERCENT ON FEEDER FROM SOURCE
0 10 20 30 40 50 60 70 80 90 100
LOAD (REACTIVE) IN PERCENT
100 90 80 70 60 50 40 30 20 10 0
CAPACITOR BANK
RATING OF BANK = CKVA OF BANK / RKVA AT SOURCE





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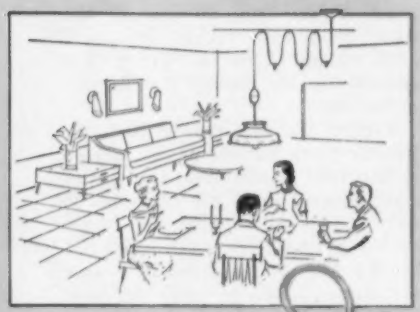

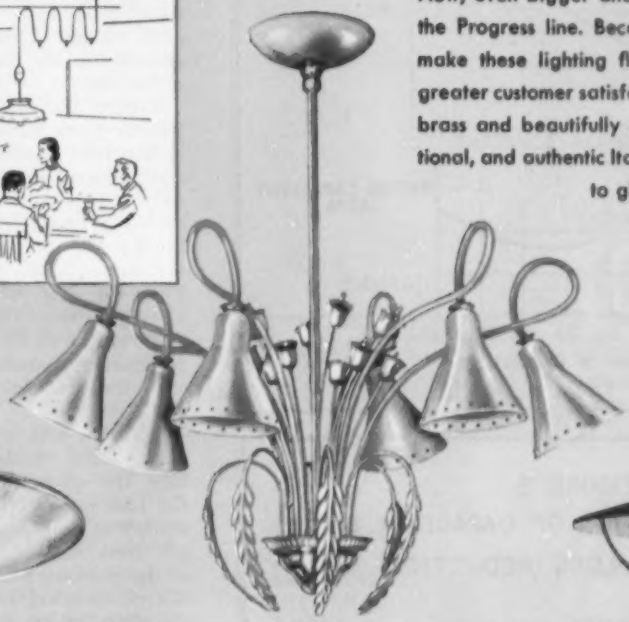

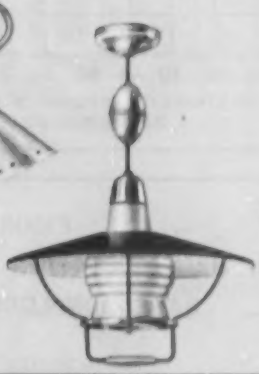

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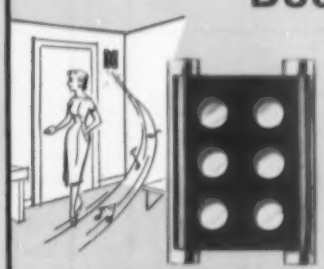

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benefits from the capacitor bank. The capacitor bank should be located along the feeder where the ckva is equal to twice rkva load.

For example, a 50% capacitor bank should be located 75% out from its feedpoint or substation. At the 75% point the reactive load is 25% and hence the capacitors ckva is equal to twice the reactive load.

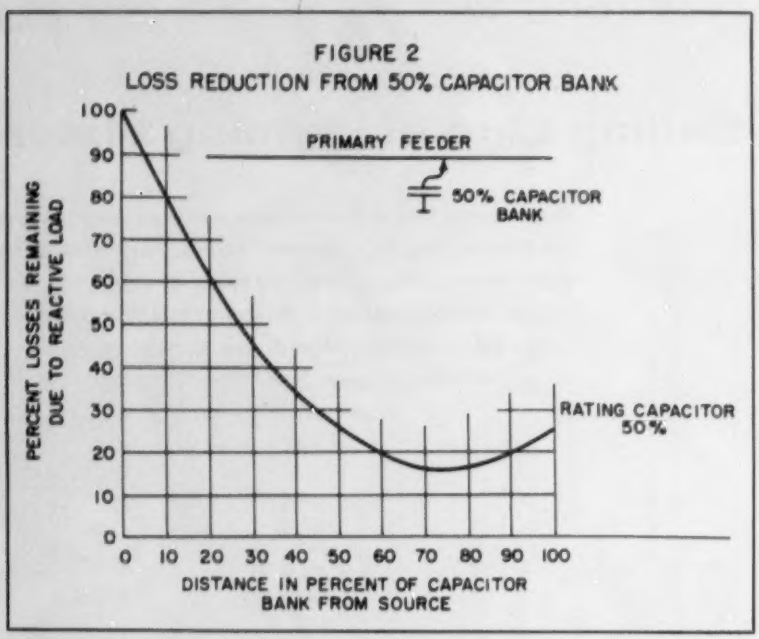


FIGURE 2
LOSS REDUCTION FROM 50% CAPACITOR BANK
PRIMARY FEEDER
50% CAPACITOR BANK
RATING CAPACITOR 50%
PERCENT LOSSES REMAINING DUE TO REACTIVE LOAD
DISTANCE IN PERCENT OF CAPACITOR BANK FROM SOURCE
0 10 20 30 40 50 60 70 80 90 100

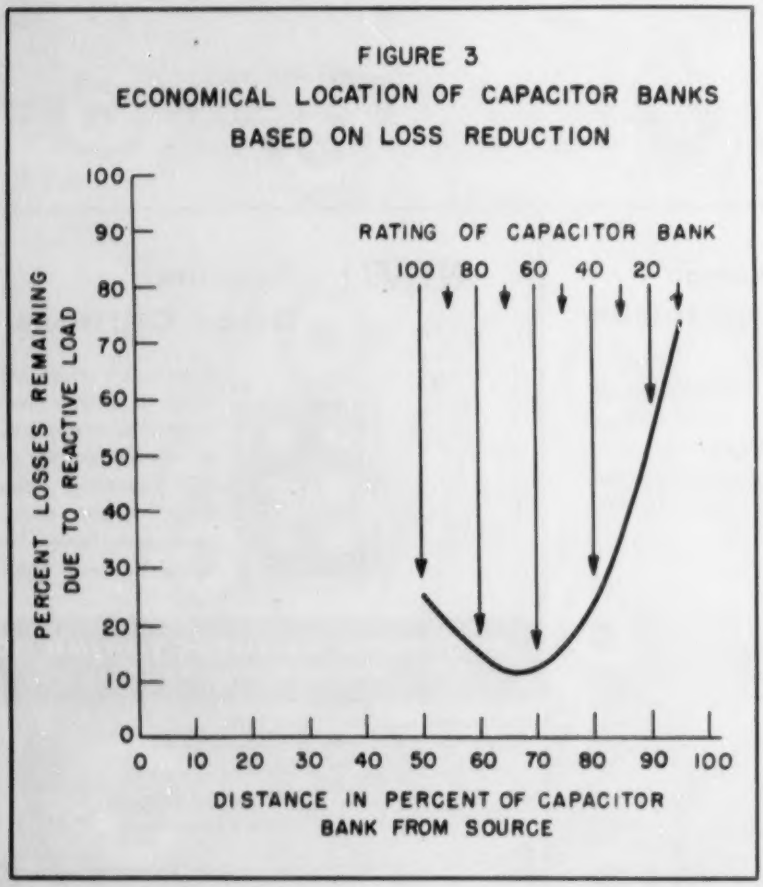


FIGURE 3
ECONOMICAL LOCATION OF CAPACITOR BANKS
BASED ON LOSS REDUCTION
RATING OF CAPACITOR BANK
100 80 60 40 20
PERCENT LOSSES REMAINING DUE TO REACTIVE LOAD
DISTANCE IN PERCENT OF CAPACITOR BANK FROM SOURCE
0 10 20 30 40 50 60 70 80 90 100

These per cent loss savings obtained only from the distribution feeder can pay for a large portion of the total installed cost of the capacitors. Assume the feeder of Figure 1 in a 4.16 kv feeder, one mile long with 1/0 conductor. The distributed load is 1500 kva at 80% power factor. The voltage drop along this feeder is 4% and there is a total of 27 kw of loss during peak load. The 27 kw is the total peak load feeder loss, and 36% of the 27 kw loss (10 kw) is caused by the feeder's peak reactive load.

Figure 2 shows that a 50% capacitor bank (or 450 ckva) located at the 75% point along the feeder can reduce the 10 kw of losses to (10 x .16) = 1.6 kw. The losses on the primary feeder are reduced by 8.4 kw. Many systems evaluate these losses at $200 per kw. The 8.4 kw would be worth 8.4 × $200 = $1680, or about 1680/450 = $3.75 per ckva. A representative installed cost for these capacitors would be around $7.50 per ckva.

Thus the loss savings just on the distribution feeder can pay for half the capacitor costs. Besides the loss savings, the capacitor installation would cause about a 1 per cent voltage rise at the end of the primary feeder. These benefits of locating the capacitors in the distribution area are benefits in addition to those determined from the a-c network analyzer studies. Thus the capacitors will pay for themselves in a shorter time and economically allow more capacitors to be added to the power system.

Controls for capacitors

For a power system to make full economic use of capacitors, some must be switched off at light load. This is a fairly simple problem for large capacitor banks located where an operator can directly control the capacitor switch according to the system requirement. For capacitor banks out in the distribution area, the capacitor switches must obtain their signal from a control containing a sensing element.

The types and varieties of capacitor controls available are quite numerous, but the principal varieties to be discussed here are as follows: voltage-sensitive; current-sensitive; voltage-sensitive current-compensated; time clock; and

time clock with voltage riders. The discussion here will point out briefly how each control operates, where it should be located on the feeder, and what types of feeders the controls might be used on.

Voltage-sensitive control. The voltage sensitive type control receives a signal from a potential transformer to energize a voltage relay. The control closes the capacitor switch at a given voltage and opens the capacitor switch at a higher voltage. This type of control is best suited for application near the end of long rural and urban feeders, out of the range of the load center held by a regulator.

To operate the voltage control, fairly accurate data is required on the feeder's voltage swing at the location control, and the relay's voltage settings must be stable with time and temperature. An example contained in Figure 4 will illustrate this problem.

A primary feeder with distributed load has a peak load voltage profile and a light load voltage profile as shown. Consider the voltage relay near the end of the line. Line 1 and 3 refer respectively to the "off" and "on" signal to be seen by the voltage relay. Obviously, these points must lie between the light load and full load voltage profile to insure the capacitor is switched off before the light load period and on before the peak load period. The voltage rise caused by the capacitor, from "3" to "2", must be below "1" in order for the controls not to hunt.

The advantage of this type of control is that it uses the capacitors to help maintain good voltage on the primary feeder, and this control can be used near or at the end of the feeder. The disadvantage is mainly in the problem of setting the relay for the feeder's load voltage swings at the capacitor bank.

Current-sensitive control. The current-sensitive control receives a signal from a current transformer to energize a current relay. At a certain value of current, the control closes the capacitor switch, and at a lower value of current opens the capacitor switch. The CT is located on the load side of the capacitor bank, hence is not influenced by the effect of the capacitors on the system.

This type of control is best applied near the beginning of a distribution feeder which is not backfed such as a primary network feeder. Industrial type feeders or feeders with irrigation load, etc., are receptive to this type of control.

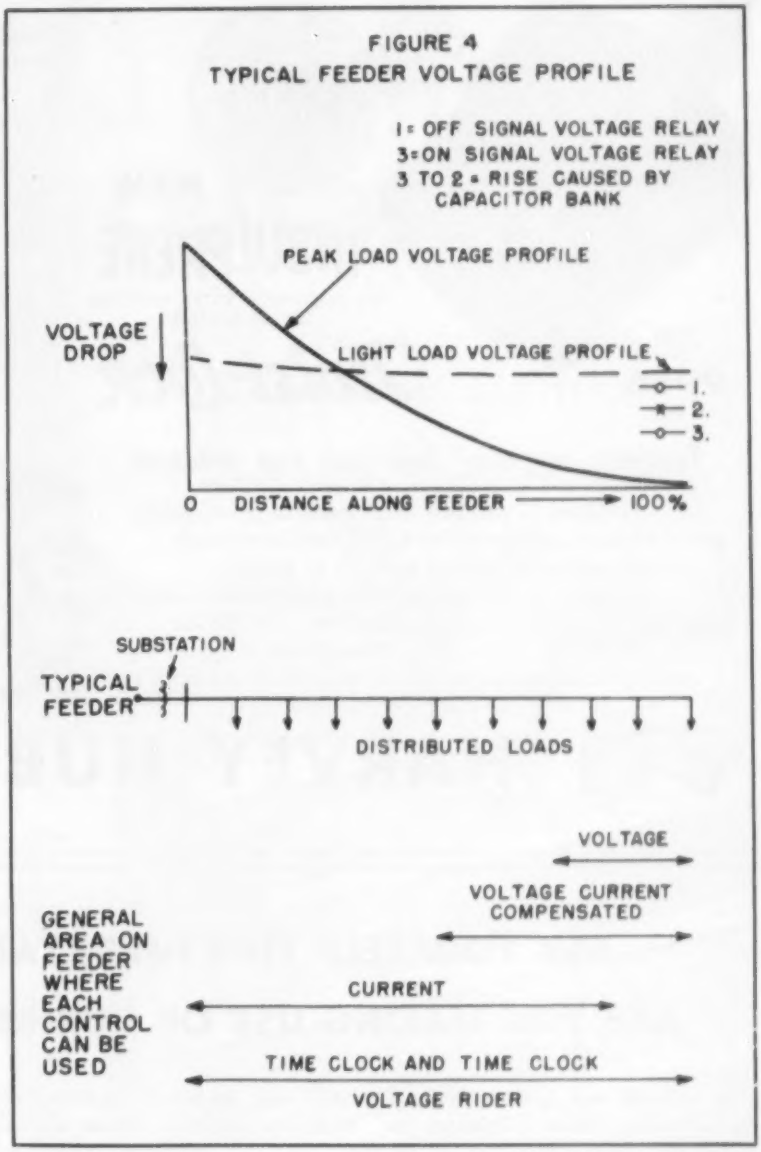
The advantage of the current control is that the capacitors are switched on and off with load. It's disadvantage lies mainly in this control's inability to sense the voltage condition on the feeder and in addition the capacitors can not be located near the end of a distribution feeder or on primary network feeders.

Voltage-sensitive current-compensated control. This control is a combination of both the voltage and current control. The current relay inserts a voltage drop in series with the voltage relay, and the voltage control operates the capacitor switch.

The effect of the current compensation can be visualized by the aid of the profile on Figure 4. The line #3, the "on" signal of the voltage relay, can now be placed below the peak load voltage profile. The control will then close the capacitor switch when either the peak load voltage profile is lower than usual or the increasing load energizes the current relay. The current relay then inserts the voltage drop in series with the voltage relay, and if the drop is sufficient, the voltage control will

(Continued on page 134)

FIGURE 4
TYPICAL FEEDER VOLTAGE PROFILE



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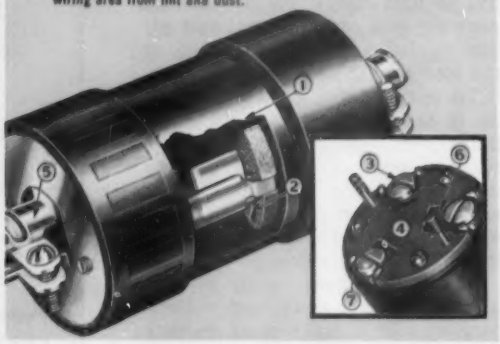

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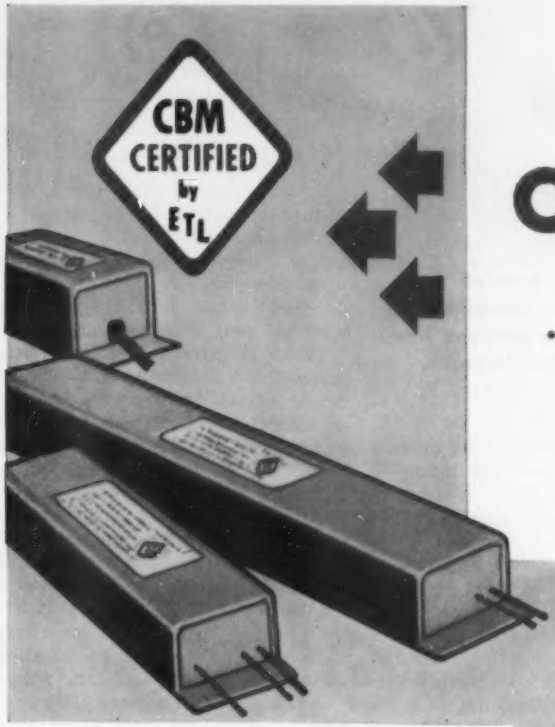

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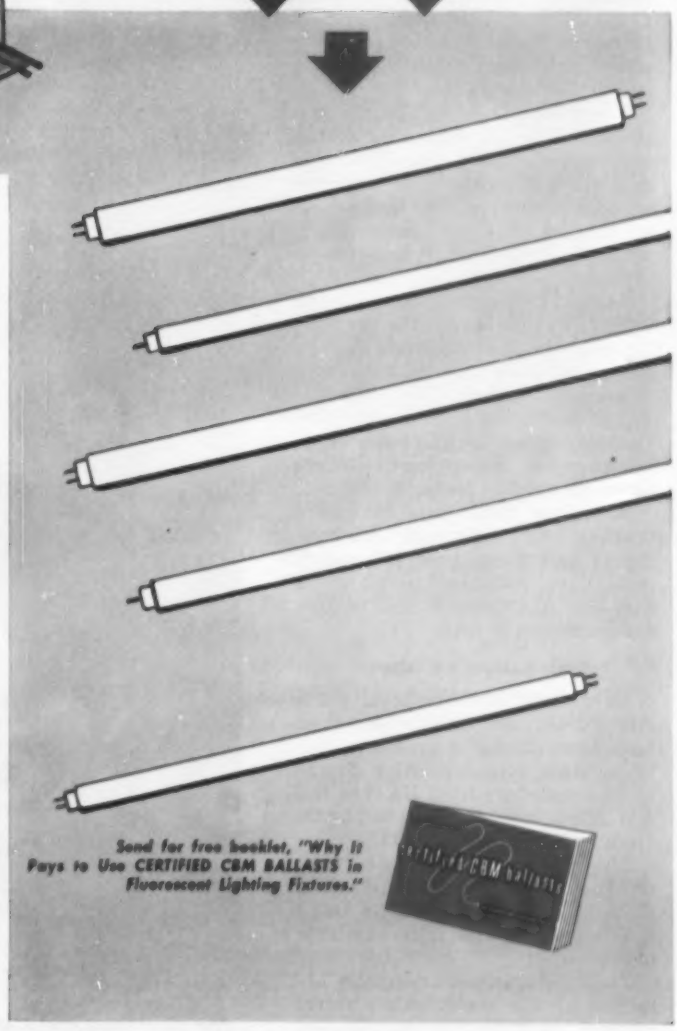
because they are "Tailored to the Tube"



Every type and size of fluorescent tube has its own specific electrical requirements. Thus, to get ideal performance and lighting economy, it is essential that the ballasts provide precisely the electrical needs of the tubes they operate.

CERTIFIED CBM BALLASTS are "Tailored to the Tube." Built to exacting specifications, then tested and checked by ETL, an independent agency, CERTIFIED CBM BALLASTS are a dependable assurance of both satisfactory and economical fluorescent lighting.

Certified CBM Ballasts

PROVIDE:

LONG BALLAST LIFE
FULL LIGHT OUTPUT
LONG LAMP LIFE
TROUBLE-FREE OPERATION

all of which contribute to easier maintenance and fluorescent lighting economy.

Eight of the country's leading manufacturers of ballasts make CERTIFIED CBM BALLASTS. Participation in CBM is open to any manufacturer who wishes to qualify.

Send for free booklet, "Why It Pays to Use CERTIFIED CBM BALLASTS in Fluorescent Lighting Fixtures."

CERTIFIED BALLAST MANUFACTURERS
2116 KEITH BLDG., CLEVELAND 15, OHIO

New device for connecting copper and aluminum wire

The joining of aluminum to copper conductors has presented difficulties—especially in coastal areas and the corrosive atmospheres of industrial centers. Now a new connector for this purpose has withstood severe test regimes and should prove advantageous.

◆ A NEW CONNECTOR for joining aluminum to copper electrical conductor in severe natural environments has been developed by Kaiser Aluminum & Chemical Corp. It has been found to perform satisfactorily in areas where many connectors have failed in a relatively short time.

Designated the ALCUnector and protected by patent rights of the corporation, in one form it consists of a deep aluminum cup and one of copper butt-welded together at the closed ends and hermetically sealed in a rubber ball and cement system.

The ALCUnector eliminates the two principal problems experienced in the past in joining the two dissimilar metals — galvanic corrosion and thermo-elastic ratcheting — and is designed for use particularly in marine and other highly corrosive atmospheres where other connectors have failed.

Extensive field tests in severe marine and industrial environments and accelerated laboratory tests have indicated in all cases that the ALCUnector will outlive the conductor it joins.

Full range of sizes

Over 3,000 ALCUnectors of the straight-through compression type have been produced experimentally in sizes accommodating aluminum conductors from No. 4 to No. 4/0 AWG and copper conductors from No. 6 to No. 2/0 AWG.

This experience indicates that the full range of sizes required in distribution circuits can be butt-welded on commercially available machines.

The conductors are normally attached by the compression barrel method. However, a combination compression barrel and split bolt connector has also proved satisfactory, and a number of ALCUnectors have been produced in open tip and in large size conductor-to-terminal designs. These indicate that the ALCUnector lends itself to almost any method required for attachment to conductors and terminations.

Details of the development of the ALCUnector were outlined recently by E. W. Greenfield, head of the electrical engineering branch of Kaiser Aluminum's Department of Metallurgical Research, and A. H. Selker, a research engineer in the department, at the summer meeting of the American Institute of Electrical Engineers.

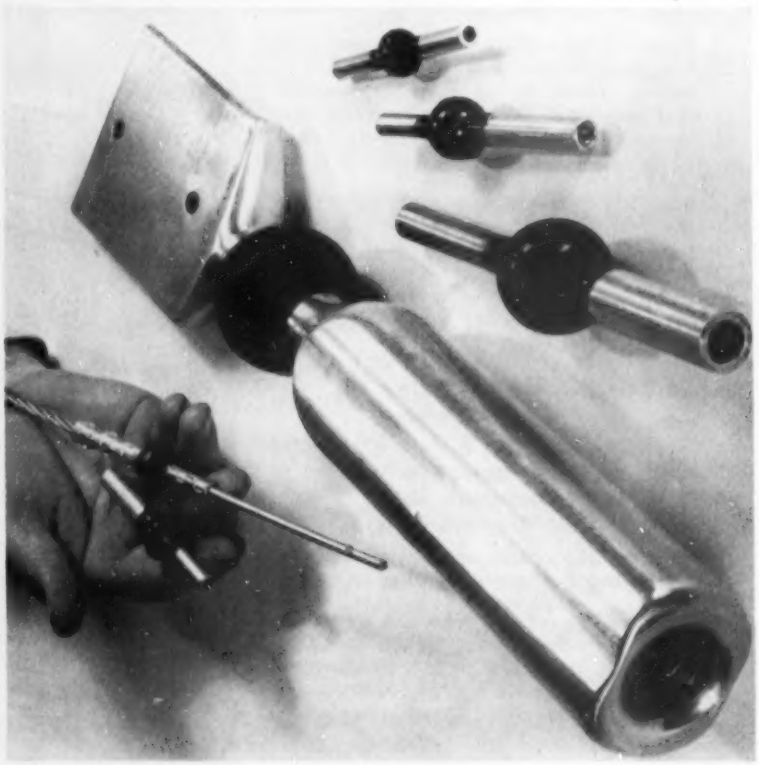
Units butt welded

The first step in its development was the conception of a safe transition from aluminum to copper metal. Development of a satisfactory butt joint at the closed ends of two tubes and an efficient weather seal were the next steps.

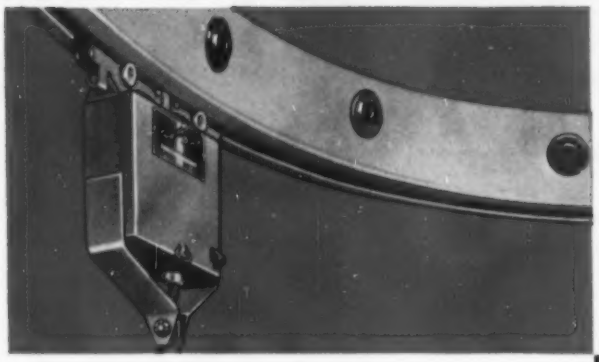
Flash or pressure butt-welding produced aluminum - to - copper bonds which were very strong — in excess of the ultimate tensile strength of the aluminum — and which added virtually zero electrical resistance to the joined sections. The boundary between the two metals after the flash was removed then consisted of a smooth line having the shortest possible length.

Over the bi-metallic boundary a stable, thermosetting insulating material of suitable size and shape

(Continued on page 133)



The new connectors shown here for joining aluminum to copper electrical conductor cover a wide range of sizes. The smallest shown joins No. 4 AWG stranded aluminum to No. 6 AWG solid copper. The largest piece is a lug terminal for connecting 1,113 MCM ASCR to copper bus.



SMOOTH-ROLLING TROLLEYS TAP POWER FROM DUCT, and can be added, removed or relocated in minutes without downtime or rewiring. Curved duct sections permit installation to fit any assembly line. Duct is rated at 100 to 225 amps to fit all mobile-tool needs.

BULLDOG INDUSTRIAL TROL-E-DUCT

Keeps Power Moving with Production

Duct tailors to any job—mobile trolleys feed and support tools!

BullDog scores again—by putting "power on wheels"! And you'll rate high with your clients when you introduce them to BullDog Industrial Trol-E-Duct®, the modern system that "trolleys" power right to the job. Smooth-rolling trolleys move along the duct with an easy tug, feeding current to portable power tools—speeding production, increasing safety. Duct sections are designed for quick installation, making it easy to plan an efficient power-distribution layout for any size plant. Trolleys can be added with ease, and duct relocated to fit plant changes—eliminating unnecessary downtime.

Installing Trol-E-Duct is sound business. Like all BullDog products, it leads to extra profits by creating greater customer satisfaction. Check into it now—ask your BullDog field engineer or qualified distributor—or write BullDog Electric Products Company, Detroit 32, Michigan.

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IF IT'S NEW . . . IF IT'S DIFFERENT . . . IF IT'S BETTER . . . IT'S **BULLDOG**

ELECTRIC PRODUCTS COMPANY

A Division of I-T-E Circuit Breaker Company

Export Division: 13 East 40th Street, New York 16, N.Y. • *In Canada:* BullDog Electric Products Co. (Canada) Ltd., 80 Clayson Road, Toronto 15, Ont.

CONSULT THE FOLLOWING SOUTHERN REPRESENTATIVES:

WILSON ELECTRICAL EQUIPMENT CO.
2930 Commerce St., P.O. Box 1725
Houston, Texas

WILSON ELECTRICAL EQUIPMENT CO.
101 E. Maple St.
San Antonio, Texas

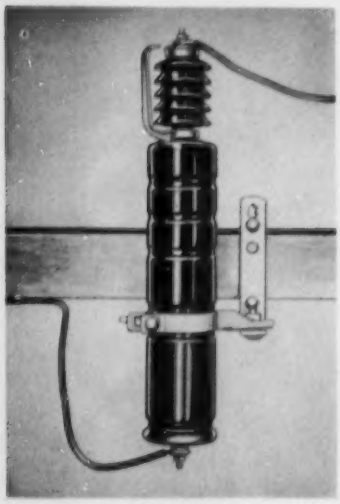
STANDARD ELECTRIC MFG. CO.
2401 Federal St., P.O. Box 1138
Dallas 1, Texas

WALKER ELECTRICAL CO., INC.
125 Bennett St., N.W., P.O. Box 8, Sta. D
Atlanta, Georgia

Notes on new utility equipment

Open gap valve arresters for crossarm installation

TYPE T open gap valve arresters for crossarm installation are now being manufactured by Line Material Co., Milwaukee 1, Wis. The new arresters feature several desirable characteristics including low impulse sparkover, low IR drop, limiting of



60-cycle follow current, positive interruption of follow current, high discharge capacity, and long life.

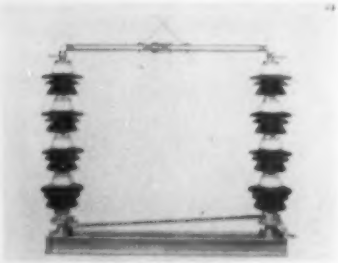
Type T arresters are available in ratings of 3, 6, 9, and 10 kv. Each arrester has an external isolating gap in series with a porcelain-housed multi-gap assembly and valve element. The primary connector is tin plated to accommodate either copper or aluminum primary conductors.

For additional data, ask for item U801, using coupon on page 100.

Chance center-break switch features functional design

A NEW CENTER-BREAK switch, designated Type "C," has been introduced by A. B. Chance Co., Centralia, Mo. The clean, functional design of this all-weather switch eliminates unnecessary bulk while retaining the ruggedness to meet today's power-switching demands. Opening and closing actions are simple and provide exceptional ice-breaking ability.

A high-conductivity current path is provided by braidless, sealed, silver-to-silver hinge contacts and high-pressure silver-to-copper jaw contacts. The blade is of hard-drawn copper and has a bronze guide at the jaw end. The sealed, greaseless main bearing assemblies have steel balls and races. Crank arms provide adjustment within 2½ degrees of any position. Adjustments that require no



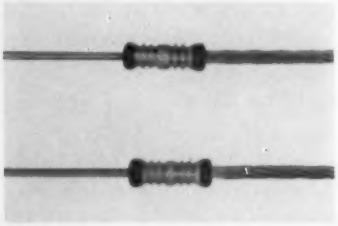
special tools permit blade and contact-arm adjustment.

This switch can be obtained for upright, vertical, or underhung mounting. It is available in the following ratings: 600 amperes, 46 kv through 161 kv; 1200 amperes, 46 kv. to 161 kv.

For additional data, ask for item U802, using coupon on page 100.

Five-eighths inch line of compression sleeves

SERVICE ENTRANCE compression sleeves made of a highly conductive aluminum alloy with an outside diameter of ⅝ inches, and designed to make use of existing ⅝ inch dies and tools, are currently available from Anderson Electric Corp., 4811 Georgia Rd., Birmingham, Ala. The ⅝ inch line consists of seventeen sizes to accommodate all popular



combinations of aluminum, ACSR, and copper conductors from #8 AWG to 1/0 AWG.

Sleeves are marked to show (1) the die size, (2) die press area, (3) catalog number and (4) complete cable size application. Fade-proof standard color-coded plastic caps are used to quickly identify the cable sizes of each groove. These caps are easily punctured so the cable can be pushed through the caps without removing them. A stop is provided in the center of the compression sleeve to prevent dissimilar cables from contacting each other.

The Anderson compression sleeves are factory filled with a special inhibitor for high conductivity, high pull-out strength and compatibility with copper or aluminum, or combinations of each. Anderson also plans to introduce a one-half inch O. D. line of service entrance compression sleeves in August.

For additional data, ask for item U803, using coupon on page 100.

New hydraulic aerial beam features flexible operation

THE POWERS-AMERICAN Division of McCabe-Powers Auto Body Co., 5900 N. Broadway, St. Louis, has announced that it is now in full production on a second model of its "Sky-Master" hydraulic aerial beam.

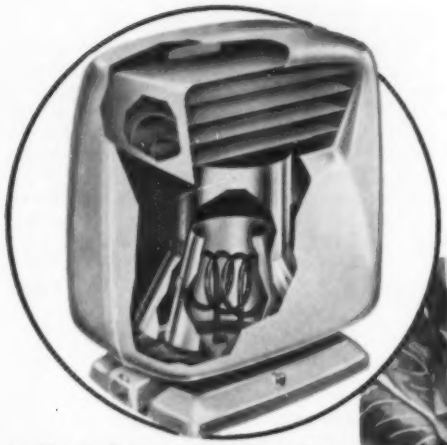
The new unit, designated the Series AB-1-41 "Sky-Master," carries a workman over, under, or around obstacles, in an insulated enclosure

which permits him to work with ground-level ease in out-of-the-way overhead places.

A pair of independently-operated steel beams, installed on a rotating mast, move the work basket to any position within operating range. There are no pre-determined spotting positions. The outer beam can be moved to any point in an operating arc of 270 degrees, and the inner beam can be positioned anywhere in a 115 degree arc. Each beam is moved by a double-acting hydraulic cylinder, through a unique system of linkage which eliminates use of chains, sprockets, and other secondary means of actuation. The supporting mast, turned by an oil-driven motor through a reducer and a spur and ring

Announcing PREWAY Vectaire® Heaters

Beautiful
DURABLE
Maintenance-free



A NEW Heating Principle

PREWAY'S Vectaire Convector operates on jet aviation's venturi principle. Expanding heated air is forced through a venturi orifice — which greatly speeds up the velocity of the air stream and eliminates all need for fans. Vectaire has no moving parts.

Patented — Model PV 151 T

More Profit for Everybody Selling Vectaire

Selling *the best* on the market is fine, but it's even easier — and more fun — to sell *the best* . . . PLUS SPECIAL EXTRA DOLLARS OF PROFIT. Here's the way to fire-up salesmen, enthuse dealers, move merchandise. Write today for full information on PREWAY'S Vectaire Promotion 56.

PREWAY'S Vectaire portable Heaters are contained in smartly styled cabinets as you can see. The case is always cool as there is practically no heat radiation. Just plug it in, set the thermostat to the desired temperature and forget it.

SPECIFICATIONS

Model No.	Watts	A.C. Volts	B.T.U.	Hgt.	Lgth.	Width	Wt.-Lbs Pkd.
*PV 151 M	1500	120	5122	21"	17"	11"	26
**PV 151 T	1500	120	5122	21"	17"	11"	26

*Equipped with toggle switch only.
**Equipped with automatic adjustable thermostat.

AS THE ONLY HEAT SOURCE		AS AUXILIARY HEAT SOURCE	
Outdoor Temperature	Area It Can Heat To 72°	Indoor Temperature	Area It Can Heat To 72°
60°	30'x30'	65°	30'x35'
50°	30'x20'	60°	30'x30'
40°	25'x20'	55°	30'x25'
30°	15'x20'	50°	30'x20'
20°	12'x20'	40°	25'x20'
10°	12'x15'		

NOW — a new name before America's foremost line of electric convectors

PREWAY has acquired the patents and production rights to Vectaire — the simplest and most trouble-free electric convector heater on the market. Here's how it operates:

Air, heated by range-type elements, is directed through a venturi orifice which does the work of a fan and propels a heated stream of air out into the room. This air stream — heated to a temperature of 200 degrees — moves at the rate of 135 feet per minute. There are no moving parts; there is no disturbing motor hum; there is nothing to get out of order! Just set the thermostat to the temperature wanted — and plug in. And thanks to this simplicity, Vectaire is priced well below what you'd expect convectors of this capacity to cost!

PREWAY — a multi-million dollar company, in the home appliance business since 1917 — also gives you the added assurance of a quality-built unit in every detail of construction. Call or write for full information and the name of the PREWAY distributor in your area.

PREWAY Inc.

9856 Third Street N., Wisconsin Rapids, Wisconsin

gear, can be rotated continuously in either direction.

All movement is controlled by three levers beside the work basket, or by an additional set of controls on the rotating mast. By means of a parallel linkage, the work basket floor is held in a horizontal position at all times, and will remain level, through gravity, should the linkage be damaged. Pilot-operated check valves are installed on each cylinder to maintain work basket position in event of any line failure or damage.

When fully extended, "Sky-Master" has a ground-to-basket floor height of approximately 41 feet, enabling a workman to comfortably reach areas 46 feet above ground. The safe load capacity in all positions is 350 lbs., having a safety factor of 5. Hydraulically-operated outriggers are installed on each side of the body to assure absolute stability regardless of work basket position.

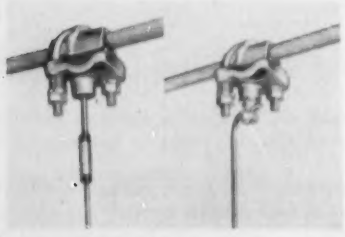
The Series AB-1-41 "Sky-Master" can be installed on slightly-modified standard bodies in the Powers-American line, or on a body designed to fit specific needs. Power for operation is derived from a hydraulic pump which is driven by a power take-off installed on the truck transmission. Other means of driving the unit, independent of the truck engine, are available.

"Sky-Master" can be furnished with an air compressor and receiver, having air lines extended to an outlet at the work basket.

For additional data, ask for item U804, using coupon on page 100.

Blackburn hot line clamp for large aluminum mains

JASPER BLACKBURN Corp., 35 Madison St., St. Louis, has developed a new hot line clamp for large aluminum mains that has all the advan-



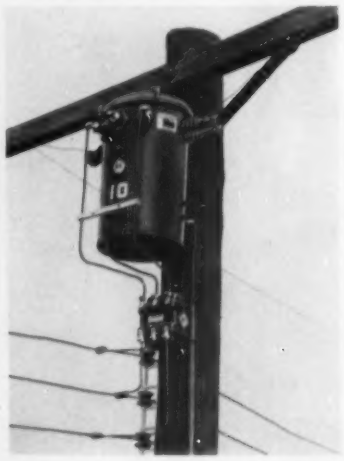
tages of a U-Bolt connection. The new clamp, called Swivelok, has a spring action that allows it to be installed easily and safely. The clamp is hung over the main with a shotgun stick and twisted. The lower casting pops up, making instant contact. It also provides a wiping action that eliminates arcing. The nuts are then tightened with a socket wrench in the shotgun stick and a trouble-free connection is obtained.

Castings and hardware for the Swivelok are of aluminum alloy. It is available with either tin plated bronze split-bolt or aluminum compression taps. Wire ranges are as follows: Main—1/0 to 336.4 ACSR, split-bolt tap—6AWG to 2/0 AWG, compression tap—6 to 1/0 ACSR.

For additional data, ask for item U805, using coupon on page 100.

New A-C autotransformer boosts secondary voltage

A LIGHTWEIGHT, economical autotransformer has been announced by Allis-Chalmers Manufacturing Co., Milwaukee 1, Wis., for boosting or bucking secondary voltages. This unit, which is produced at the firm's



Pittsburgh Works, offers convenient voltage control to utilities who economize by using no-tap transformers on their distribution systems.

The new autotransformer is also suitable for adjusting the voltage ratio of distribution transformers from one voltage to another.

Molded in epoxy resin and fitted with electro tinplated clamp connectors, the autotransformer is small, compact, relatively light, and can be easily mounted in several positions on poles, crossarms or buildings. It is tough enough to withstand severe operating and weather conditions.

For additional data, ask for item U806, using coupon on page 100.

Current transformer cabinets offered in variety of sizes

NEW CURRENT transformer cabinets in a variety of stock sizes, with either single or double doors, have been added to the entensive line of wiring installation equipment, produced by Keystone Manufacturing Co., 23328 Sherwood Rd., Center Line, Mich.

Stock sizes offered in single door types are: 24"x24"x10"; 30"x24"x10"; 36"x24"x10". Double door types are available in the following stock sizes: 30"x30"x10; 36"x30"x10"; 36"x36"x 10". In addition to the standard line of current transformer cabinets, Keystone also offers a complete engineering and custom manufacturing service on special cabinets of any design, size and specification. This service is available to provide cabinets designed to meet the special structural requirements and conditions encountered in many wiring installations.

The cabinets are manufactured from heavy gauge sheet steel and are strongly fabricated and securely welded. Standard hardware is the three-way catch and vault handle, but other styles of hardware, catches and locking equipment are also available. Standard finish is a high grade, baked-on gray enamel.

For additional data, ask for item U807, using coupon on page 100.

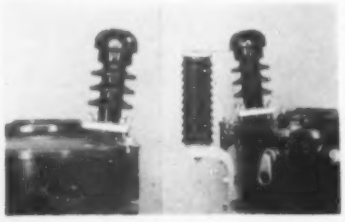
Tension wire stringing subject of new film

A NEW nine minute 16 mm color sound movie showing controlled tension stringing of overhead power lines is available to the utilities industry. Entitled Stringin' Along With Pengo, the new film shows in detail the Bechtel Corporation stringing 1,033,500 cm grease-impregnated ACSR on a twin circuit tower line, the most important feature of which is the use of the Pengo tension wire stringers. The line was constructed for the Southern California Edison Company in Los Angeles. Film is available from Petersen Engineering Co., Inc., Santa Clara, Calif

For additional data, ask for item U808, using coupon on page 100.

New "Quick-Grip" high voltage bushing

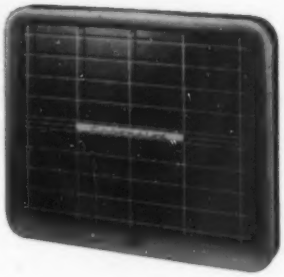
A HIGH voltage bushing for distribution transformers rated above 5 kv is now offered by the Kuhlman Electric Co., of Bay City, Mich. The new bushing features a hard rubber hand-



grip insulated connector for protection against service interruptions caused by birds and/or animals coming in contact with live parts.

Based on the principal of Kuhlman's original "Quick-Grip" design for voltages below 5 kv, the hand-grip connector also allows quick easy line installation.

For additional data, ask for item U809, using coupon on page 100.



RADIANT WALL PANELS

in two attractive color-combinations, modern styling to blend with any decorative scheme. *All-Metal*, completely sealed, metal enclosed tubular element. Break-, moisture-, and shock-proof. No back insulation required; no moving parts. Completely factory-assembled for easy installation. Optional built-in adjustable thermostat for fully-automatic use.

FAN-DRIVEN WALL INSERT HEATERS

pack a lot of heat into a small space. Separate switch sets heater in automatic operation without disturbing thermostat setting. Chromalox heating element is moisture-proof, break-proof, and safe. Sepia Brown grill and beige front cover blend with any decorating scheme. 1½" projection from wall and air seal prevents leakage and dirt streaks along the wall surface.

CEILING THERMWIRE

hidden in the ceiling offers one of the most satisfactory ways of providing comfort heating for modern living. Specially constructed and insulated cable, completely covered, gives noiseless, draft-free heat. Use anywhere—either new or remodeled homes—on plaster or dry wall construction. Individual thermostats can be used to control the temperature of each room.

BASEBOARD HEATERS

use the famous Chromalox strip heater proved in more than 35 years of rugged industrial service. Installs fast—2 screws hold it—2 wires connect it. Four lengths fit any wall. Blanks, corners, and trim complete custom-tailored installation. Paint to match any color scheme. Two-heat construction available for modulated output. Puts the heat where losses occur, eliminates cold floors.

RADIANT BATHROOM HEATERS

are designed especially to provide comfort and safety in bathrooms. Fits between wall studs. Meets FHA standards. Metal sheathed heating element gives absolute safety from shock. Attractively styled, modern in appearance. High radiant heat, without moving air, to warm you as you step from shower or tub.

5 Ways to Make Big Remodeling Profits

Electric heating of added-on rooms, gamerooms, finished attics, closed-in porches and breezeways cuts heating costs by eliminating hard-to-extend ducts and pipes plus overloading the existing central heating system.

Chromalox Electric Heat is comfortable, convenient, automatic. It installs as easily as a lighting circuit and your customers will like the individual room temperature control . . . always the right heat for comfort regardless of the rest of the home. These five Chromalox Heaters, backed up by national and local promotion, open the door to greater profits for you . . . they are the safe, logical, modern method of applying heat to expanded homes.

Write today for complete product information.

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- ☐ Bulletin 960—Electric Home Heating Products Guide
- ☐ Bulletin 800—Baseboard Heaters
- ☐ Bulletin 950—Radiant Wall Panels
- ☐ Bulletin 955—Fan Driven Wall Panels
- ☐ L-1201—Radiant Ceiling Cable
- ☐ L-1153—Thermostats
- ☐ L-1206—Radiant Bathroom Heater

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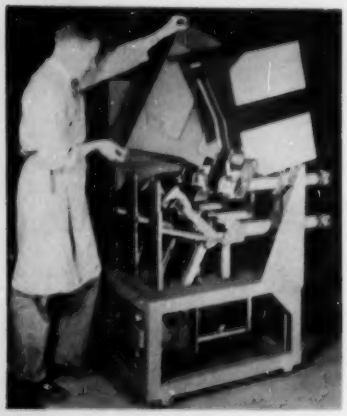
D-8154

New five and fifteen kv magnetic air breakers

NEW FIVE and fifteen kv magnetic air circuit breakers to extend the line through 250 and 500 mva interrupting capacity are now available from Federal Pacific Electric Co., 50 Paris St., Newark, N. J., according to R. W. Hutchinson, product sales manager, Pacific Switchgear Division.

"These new type DST breakers are the result of two years of intensive research, development, and testing,"



Mr. Hutchinson said. "Production of the 5 kv, 250 mva unit has begun and the other ratings will follow."

The DST 5-250 breaker is a horizontal drawout device for use in metal-clad switchgear manufactured by Federal Pacific's Eastern Switchgear Division at Scranton, Pa.

Special design features include arc chutes which can be tilted back for contact inspection, eliminating the necessity for handling the heavy ceramic chambers; a high capacity "puffer" system to assist arc blowout on low current operations; fast, dependable solenoid operation.

For additional data, ask for item U810, using coupon on page 100.

Leakproof plastic dispenser for conductive compound

CONTAX, a conductive compound manufactured by Jasper Blackburn Corp., 35 Madison St., St. Louis, is now being packaged in a new container. Unlike the lead alloy containers now generally used in the industry, Blackburn's container will not crack or leak and will withstand a great amount of work abuse without breaking. Blackburn's new container is of soft vinyl plastic, will dispense almost 100% of its contents, and is re-fillable. It is easily handled, dispenses just the amount of Contax desired, and eliminates the mess to tools and hands created by old style containers. Besides saving time and tempers on the job, the new container saves the user money by reducing the amount of material wasted due to "throw-away" losses from cracked tubes.

Blackburn Contax is a mineral base grease with non-gassing zinc dust held in suspension. Zinc particles penetrate the oxide film, improving the connection electrically. The compound seals out air and moisture and protects against galvanic corrosion. The ASTM drop-point of Contax is higher than most others on the market.

For additional data, ask for item U811, using coupon on page 100.

Air-curing, invisible resin repels water from insulators

DEVELOPMENT of an air-curing, invisible resin to repel water from all types of insulators and other ceramic equipment has been announced by Wunda-Vu Products Company, 1522 So. Staples St., Corpus Christi, Tex. The new product is named XL-2, and it will be distributed nationally.

XL-2 is not actually a new product, according to Wunda-Vu engineers. It has been in existence for two years, but has not been marketed because of extensive tests to determine its full effectiveness.

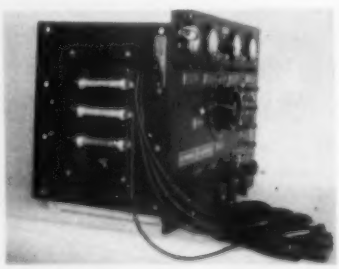
XL-2 has proven itself especially effective in protecting antenna insulators on boats, ships, and aircraft, from radio-frequency leakage due to water films.

For additional data, ask for item U812, using coupon on page 100.

Network protector field test set

A COMPACT network protector field test set is now being produced by General Electric Company's Low Voltage Switchgear Department.

With the new test set, all calibration tests on the relays, control devices and operating motor mechan-



ism of the protector can be performed as effectively at the field location as in a laboratory, according to a General Electric engineer.

The portable unit is suitable for testing network protectors for both 125/216 and 277/480 volt applications. Complete testing can be accomplished by one man.

Power to operate the field test set is taken from the secondary bus of the network. Clip-on cables are provided for this purpose.

For additional data, ask for item U813, using coupon on uage 100.

Cooling fans prolong transformer life

PROLONGED transformer life, through the elimination of excessive internal temperatures, can be achieved with Type TRAF transformer cooling fans, manufactured by Chelsea Fan & Blower Co., 639 South Avenue, Plainfield, N. J.

Designed for either indoor or outdoor use, Chelsea transformer fans will reduce excessive heat when

transformers are overloaded and prevent insulation deterioration. Available in 20" and 24" models with either three or four-bladed propellers, Chelsea transformer fans deliver up to 9200 cfm. The direct drive, ball bear- 9200 cfm.

For additional data, ask for item U814, using coupon on page 100.

Flashing visual signal for danger warning

INFORMATION on the "Gyralite" flashing visual warning signal for accident-prevention and commercial attention-getting purposes is available in a new bulletin, No. 632, prepared by The Pyle-National Co., 1336 N. Kostner, Chicago 51, Ill.

Maximum warning effect at lower maintenance cost is claimed for the Gyralite signal by the manufacturer. Mounted in a heavy cast aluminum housing, it flashes 96 times a minute in red, clear or colored light. It is recommended for railroad trains, shop trucks, open manholes, emergency vehicles, open work areas, school crossings, or for roadside business attractions; and is available for a wide range of voltages.

For additional data, ask for item U815, using coupon on page 100.

The World's Largest Office Building

Chooses

PHILITE

RAPID-START

TROFFERS

SOCONY-MOBIL BUILDING • NEW YORK

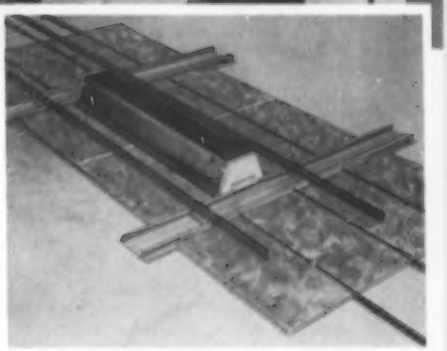
Owner, John W. Galbreath & Co.
Electrical Contractors, Fischbach & Moore, Inc.
rchitects, Harrison & Abramovitz and John B. Peterkin
Lighting Engineer, Edward Ashley
Lighting Fixtures by Ruby-Philite Corporation.
Builders, Turner Construction Company

Installation in a typical general office area with acoustiline ceiling.

Over 30,000 Philite Troffers

Installed in New Socony-Mobil Building

These installations consist of 4-foot, 2-light, 40-watt, rapid-start troffers with Corning #70 low-brightness lens and Corning #66 Albalite glass. This fixture is used in various ceiling patterns and in continuous runs of 8 feet, 12 feet, 16 feet and 20 feet in various areas. It is installed in the following types of ceilings: acoustiline; metal pan with T-bar; plaster; fissured tile, with H-bar. This troffer is available also for use with other types of ceilings.



Method of installation in acoustiline ceiling (as seen from above), showing acoustical panels, T-splines, furring channels and metal pans which support the fixture.

PHILITE

Ruby-Philite Corp.

32-02 QUEENS BLVD., LONG ISLAND CITY 1, N. Y.

Electrical heating products parade

General Electric

EQUIPMENT for electric radiant heating is one of the newer product lines now offered by the Wiring Device Dept., General Electric Co., Providence 7, R. I. The entire heating plant for a house consists of heating wires for embedment in the ceilings, thermostats, and, of course, connections to the electric power supply.

G-E electric radiant heating wire is supplied in a variety of lengths and wattage ratings for use with 240- and 120-volt power supplies. 240-volt units are available in 12 dif

ferent lengths from 156 to 1481 feet, and 400 to 3800 watts. 120-volt units in a choice of 12 lengths from 78 to 740.5 feet, vary from 200 to 1900 watts in rating.

Installation can be handled by any competent electrician. The heating wires, which are available in a variety of lengths and wattage ratings, can be applied equally well to plaster ceilings or laminated gypsum wallboard ceilings. They are stapled in place quickly and easily, then covered with plaster and/or mastic and wallboard.

Electric baseboard heaters, designed for use either as the sole heating system for a house or as auxiliary units where supplementary heat is desired, are now offered by the Wiring Device Department of G-E. The heater panels are available in 1-, 2-, 5-, and 8-foot lengths with power ratings of 100, 300, 800 and 1250 watts respectively at 240 volts. Any combination of these units may be ganged together to attain the required wattage.

Panels are constructed of #22 gage sheet steel. An enclosed strip-type heater unit is permanently mounted to the back section of the panel and wired to a power supply junction box attached to this same section. The front cover plates hook onto the back panels to facilitate easy removal for cleaning. Matching blank panels, corner plates and splice plates are also furnished for completing the trim and giving the installation the appearance of one continuous baseboard strip.

For additional data, ask for item H816, using coupon on page 100.

Electromode

TO SATISFY the growing demand for electrical heating, the Electromode Division of Commercial Controls Corp., Rochester 3, N. Y., has greatly expanded its line of electric space heating equipment. Electromode heaters are made in more than 100 different models including those for use in homes, industry, and on the farm.

In the Electromode line of home heaters are wall insert models for both large rooms and small rooms, with one model designed especially for bathrooms. In these wall models the heat is fan-circulated. Another type wall insert model is the Electromode radiant panel heater which combines the principles of radiant and convection heating.

In the fan-circulating heaters Electromode has also designed one for easy mounting on hard surface walls, such as concrete, brick or stone. This makes the heater ideal for use in basement game rooms, laundry, workshop, garage, or office building entrance. All of these heaters include the famous Electromode Safety Grid heating element, with all electric wires completely sealed inside a finned aluminum casting, eliminating any danger of fire, shock, or burn.

Electromode baseboard electric heaters give home owners the much-desired, modern, perimeter heating, spreading comfortable warmth against cold outer walls. They are automatically controlled by separate wall thermostat in each room. The neatly designed baseboard units, which conceal the Safety Grid heating element, are finished in silver grey hammertone which presents a pleasing appearance just as it is. If desired they may be painted to blend with the room decor. Matching blank sections, endpieces, and corners are available for carrying out an unbroken, pleasing baseboard effect in any design or size room.

Another of the more recent additions to the Electromode line is radiant cable heating. It may be installed in plastered or drywall ceilings, concrete floors, and driveways. Electromode heating cables are a measured length of specially constructed and insulated electric wires; waterproof and non-corrosive. A special feature of Electromode heating cable is the Magic Seal, a transparent coating over the cable which prevents streaks on the ceiling when the cable is embedded in plaster.

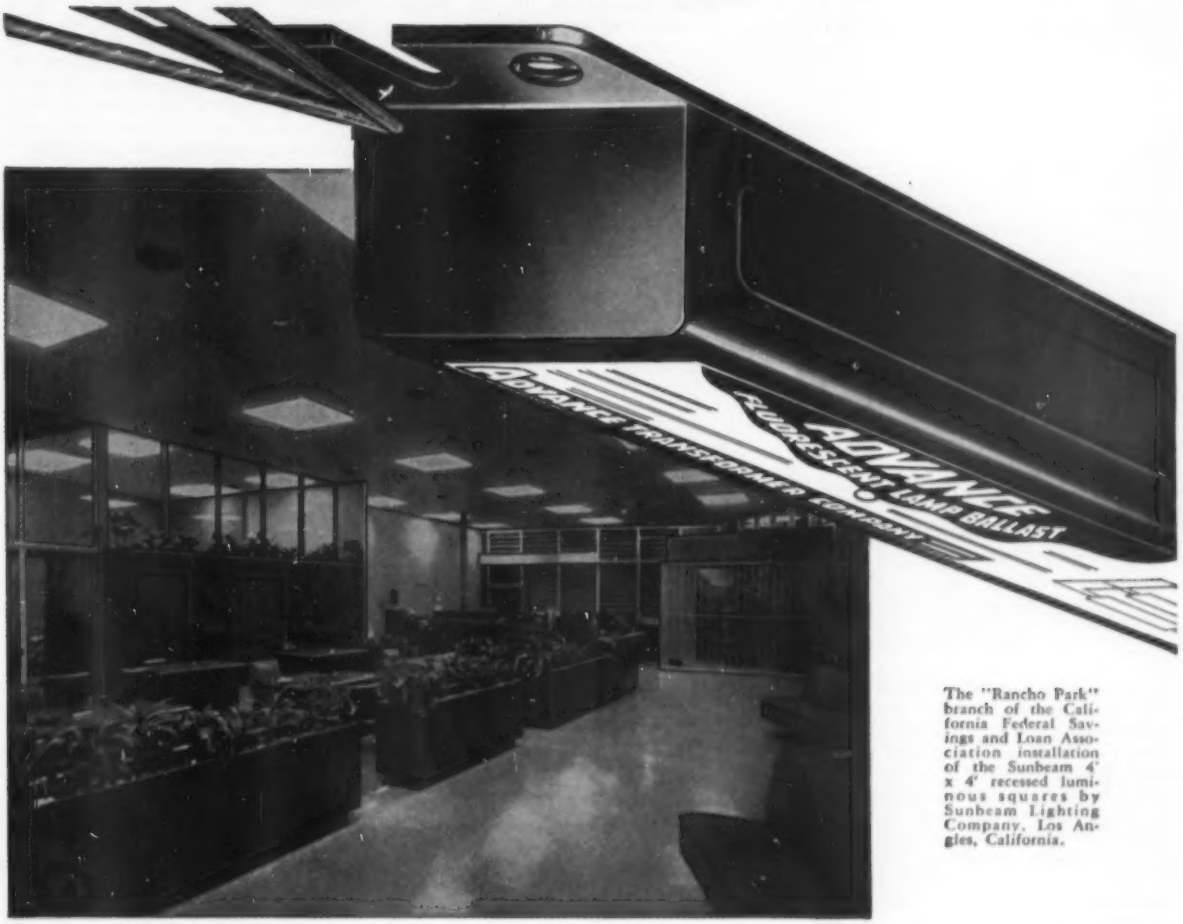
Undoubtedly the most popular heater in the extensive Electromode line is the bathroom model. Many times heat is needed only in the bathroom. There's no telling when a chilly morning may make the bath-

room too uncomfortable for bathing or shaving. It can happen anytime—summer or winter, and especially between seasons when the central heating system is not being used.

An automatic Electromode electric heater installed in the bathroom provides immediate heat right where it is needed, without heating up the rest of the house. The grille is scientifically engineered to direct heat downward providing maximum heat distribution and preventing heat loss since the warmed air leaving the heater is carried down to the floor.

Another feature of this heater which makes it especially desirable for the bathroom is that the fan-circulated heat is ideal for drying hair, lingerie, etc.; also moving air helps prevent bathroom steaminess. These heaters, available in either gleaming chrome or white enamel finish, are handsome in appearance

Silent Partner



The "Rancho Park" branch of the California Federal Savings and Loan Association installation of the Sunbeam 4' x 4' recessed luminous squares by Sunbeam Lighting Company, Los Angeles, California.

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To receive peak performance from fluorescent lighting it is most essential that the ballast . . . the heart of a fluorescent fixture . . . match precisely the electrical requirements of the lamp it has been designed to operate. The fluorescent lamp ballast should have endurance to supply years of quiet, trouble-free service and it must provide economy of operation.

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and add to the beauty of any bathroom.

For additional data, ask for item H817, using coupon on page 100.

Heatmore

HEATMORE, INC., 59 Throop Avenue, Brooklyn 6, N. Y., exclusive manufacturers of electric ceramic radiant heat panels, now has available baseboard panels that are unique in that they are of identical dimensions and appearance, but come in four different wattages ranging from 290 to 1000 watts per 8" x 26" section.

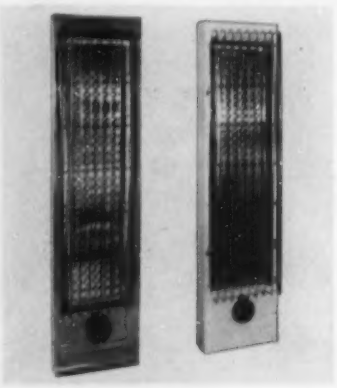
Baseboard heating systems, either electric or otherwise, normally offer a fixed heat output per lineal foot, regardless of the fact that heat losses along outside walls are not always

completely the same per lineal foot. For example, no one can deny that more heat is needed under a window than elsewhere at the base of a solid wall. With Heatmore panels more or less heat can be located where more or less heat is needed—with no change in appearance or size of the heaters. Thus, matching panels of different wattage combinations, as required, can be mounted end-to-end to assure delivery at floor level of truly more uniform warmth and draft-free comfort than ever before realized.

Perhaps just as interesting is the fact that the higher wattage density in some of these new Heatmore panels provide an extremely low cost-per-watt and unit cost that also means fewer panels per room are needed, and therefore even greater savings in lower initial and installation costs.

The versatility of these ceramic panels lies in their exclusive method of construction. By completely imbedding nickel-chromium resistance wire (the finest man-made source of infrared rays or radiant heat) inside a ⅝" thick rugged ceramic composition, a virtually life-time radiant heat panel results. Like brick or stone, the inherent qualities of heat radiation and retention of ceramic are familiar to everyone. It has been used in ovens and kilns for centuries.

Also now being introduced by Heatmore is an entirely new series of fully automatic, vertical ceramic radiant heat panels, housed in gleaming chrome or oven-baked white enamel steel frames. These attractive slim Heatmore panels provide full length radiant warmth in bathrooms kitchens, halls or in any room where wall space is narrow or limited. Sur-



face mounted units are 7½" wide, 31½" high and extend only 2" from wall. Recessed panels are of similar dimensions, but are almost flush with the wall after installation. A built-in thermostat and indicating pilot light is standard equipment with this series, which is available in 500-, 750- or 1000-watts.

To the expanding Heatmore line has also been added attractively priced 1500- and 2000-watt wall-mounted panels of same size and appearance as its 1035-watt PK models. This exclusive compact feature of ceramic panels saves wall space and improves appearance by eliminating large, awkward panels. Also enables tremendous savings in unit cost and installation expense.

In addition to these baseboard, wall-mounted and bathroom models, Heatmore makes ceiling-suspended ceramic panels that are as simple to install as a lighting fixture, as well as plug-in wall-mounted and portable panels.

For additional data, ask for item H818, using coupon on page 100.

Cavalier

THE CAVALIER LINE of quality automatic electric heating equipment includes baseboard, wall insert heaters, surface mounted wall heaters (of particular interest for installation on masonry surfaces), portables, floor furnaces, and lifetime stainless-steel-and-aluminum bathroom and kitchen heaters. A wide range of sizes and capacities is available.

Cavalier electric baseboard has several unusual features which have great appeal to home owers. It installs without cutting into walls or floors. Simply replaces part of the regular wood baseboard trim. Special thermostatic control sections are available which fit right into the baseboard lineup—eliminating the necessity for cutting holes to install wall type thermostats and saving on wiring costs. Temperature is controlled by individual rooms—a distinct improvement to zone controls which regulate temperature by sections of the home.

Special 110v duplex electrical outlet sections which build right into the baseboard are also available—providing convenient "plug ins" where desired. As many as needed or wished can be installed. While delivering 100% efficient heating, the surface temperature of Cavalier electric baseboard remains below 125° F.—an exclusive feature.

The secret of its efficiency lies in improved design for the interior air

passages, plus the heat reflecting power of aluminized steel. Cavalier's exclusive zig-zag air passages channel the air over the heating elements, the reflective baffle increases the flow of warmed air yet lowers the surface temperature of the baseboard. When placed below large glass wall areas or picture windows, it reduces condensation — practically eliminates troublesome "sweating" or clouding of glass surface.

For additional data, ask for item H819, using coupon on page 100.

Chromalox

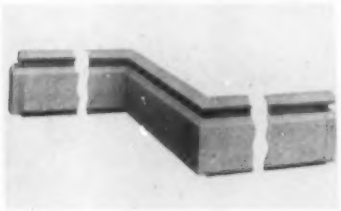
A COMPLETE line of electric heaters of all types for the home is available from the Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh 8, Pa., all of which feature the Chromalox metal-sheathed heating element. The line includes baseboard heaters, radiant wall panels, fan-driven wall insert heaters, radiant bathroom heater, utility spot heater, and Chromalox ceiling Thermwire (heating cable).

The Chromalox baseboard heater is

particularly applicable to home heating because of its small, compact design. It measures 8⅞" high x 2-9/16" deep x standard lengths of 1, 2, 5 and 8 feet. Supplied for 120 or 240 volt with wattage outputs from 100 to 300 per lineal foot. All units are painted a protective bonderized gray finish especially treated for brush or spray application of paint of any color to suit installation decor.

Both line voltage and low voltage thermostats are available for individual room control. Additional two-stage thermostats may be used to pre-activate certain sections where the greatest heat-loss occurs. This counteracts the great heat loss from exposed window areas and tends to maintain a more even heat throughout all parts of the room.

Baseboard by Chromalox is particularly useful in heating added-on-rooms, finished attics, enclosed breezeways, finished basements and



other sections of the home normally almost impossible to heat with conventional, central "duct systems." Original equipment costs are lower, installation is easy and less costly, and operating costs in a properly insulated home are similar, in most sections of the country, to the fuel costs of conventional heating systems.

The line of radiant wall panels is available in 1000 and 1500 watt sizes, 120 and 240 volts a-c, with built-in or wall mounted thermostat. These units mount flush with wall on two wall brackets, and come completely assembled with built-in terminal box.

The fan driven wall insert heaters are rated 230-240 volts a-c only and are available in 1500, 2000, 3000 and 5000 watt sizes. The fan is a low speed, quiet running fan. Heating elements are finned tubular sheathed type. A separate wall box mounts between standard stud spacing and permits wiring to be installed before plastering.

The special radiant bathroom heater is rated 1320 watts for 120 or 240 volts a-c. It is equipped only with on-off switch for control and features a separate reflector box with deep embossed chrome reflector to give maximum radiation. The metal sheathed tubular heating element is shock, moisture, and break proof.

Chromalox ceiling Thermwire is supplied in sets of various lengths, 120 or 240 volts a-c, to give wattage output from 200 to 3800 watts. Ceiling Thermwire consists of a specially constructed resistor wire covered

3

EASY WAYS TO PROFIT

WITH THE

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AUTOMATIC ELECTRIC

PORTABLE HEATING SYSTEM

Plugs into 220V outlets. 2, 3 and 4KW sizes.

Sell homeowners, renters, remodelers:

● Many prefer Cavalier Portables to any other type of electric heat. They're easy to move from room to room . . . can be stored in summer. Completely automatic.

HOMEOWNERS

● Homeowners are not your only prospects. With Cavalier Electric Portables, a renter can enjoy all the advantages of comfortable, automatic electric heat . . . takes his heating system when he moves!

RENTERS

● Remodeled homes generally require extra heat. The Cavalier Portable System is "tailor-made"! No need to overwork the original heating system to keep added rooms warm and comfortable.

SUPPLEMENT FUEL SYSTEMS

REMEMBER: It's simple and easy to install complete, automatic electric heat in any home with Cavalier Portables. You sell the heaters, then simply install the proper outlets. The job is done in a matter of hours. You've made a profit and you'll keep it, too, for callbacks on Cavalier Portables are practically unknown!

The Selling Season is just ahead . . . write today for full details!

CAVALIER CORPORATION, Electric Heating Division

CHATTANOOGA, TENNESSEE

B-M INDENTER TYPE FITTINGS FOR E.M.T. Concrete-tight

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Red Throat
Cross section

Briegel, the Original Indenter Fittings are neater in appearance, easier and faster to use. Installation is simple and less expensive. Two quick squeezes sets them forever. Try B-M Indenter Fittings and get more profits from each job.

All B-M Indenter Fittings are U.L. Approved as concrete-tight and for general use (File Card E10863). Also comply With Federal Specifications W-F-406.

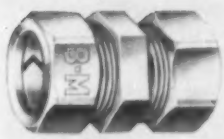
BRIEGEL METHOD TOOL CO.
GALVA • ILLINOIS

Warehouse Stocks in Principal Cities for Immediate Delivery!

B-M COMPRESSION TYPE FITTINGS FOR E.M.T. Rain-tight

SIZES FROM ½" to 2"

SIZES FROM ½" to 2"



SIZES ½" ¾" 1"

SIZES ½" ¾" 1" 1¼"

SIZE ½"

BRIEGEL METHOD TOOL CO.
GALVA • ILLINOIS

with insulating cable which is stapled to ceiling lath and covered with plaster. It supplies heat at about 105° F. on ceiling surface. A completely hidden radiant heat source, it may be accurately controlled with little temperature overshoot or undershoot because of small 'heat holding' ceiling mass. Line voltage and low voltage thermostats are available for individual room control.

For additional data, ask for item H820, using coupon on page 100.

Westinghouse

AN ELECTRIC baseboard home heater capable of meeting the requirements of any climate, economical to install, operate and maintain, has been introduced by Westinghouse Electric Corp., Sunnyvale, Calif.

The baseboard heater and other models in the Westinghouse home heating line were displayed recently during a press exhibit and meeting of the electric house heating equipment section of NEMA, held in New York City.

Installed in two-foot sections, as many units are used in each room as

engineering specifications require. A control panel is coupled into the heating system of each room, allowing room-by-room use and conservation of heat. The units can be used in a single room or throughout the house. There are no moving parts. The system saves space and construction costs in homes by eliminating the central heating unit, air ducts and radiators.

Wiring required for the baseboard heaters is identical with 240-volt circuits normally used for conventional electric ranges and water heaters. The heaters are adaptable to any decorative plan. Surfaces are of neutral brown hammertone enamel which needs no further finishing, but they can be painted any color desired. Designed primarily for surface mounting, the units can be recessed to mount against studding. Cleaning can be done with a regular vacuum cleaner.

In addition to the baseboard heaters, the Westinghouse line of electric heating equipment includes wall models rated at from 1000 to 6000 watts. All wall models operate at 240 volts, and have individual thermostat controls.

The line also includes a special bathroom model wall heater for op-

eration at 115 volts a-c, rated at 1250 and 1500 watts, and three 240 volt floor model heaters rated 2000, 3000 and 4000 watts, with built-in thermostats.

For additional data, ask for item H821, using coupon on page 100.

Electrend

AN IMPORTANT new engineering development has been incorporated in the electric forced air heating system, manufactured by Electrend Products Corp., of St. Joseph, Mich.

The new development incorporates a highly sensitive hydraulic action thermostat, designed especially for

electric heating, which maintains a minimum of ½° temperature differential. In conjunction with the thermostat a bonnet control has been added, which operates the fan independently of thermostat action. The fan now distributes all heat generated within the heating cham-

ber before shutting itself off. Through the incorporation of the new control system, a silent off-and-on-action has been accomplished and the relay formerly used has been eliminated.

Introduced to the market approximately three years ago, Electrend utilizes the efficient counterflow principle of "turning the room air upside down." That is, drawing the already warm air from below the ceiling and recirculating it down through a duct installed within the wall. The necessary additional heat is added as it passes through an electric heating chamber and then is delivered out into the room just above floor level.

Electrend systems maintain the exclusive feature of operating the fan only during the hot seasons, thus offering the feature of a built-in fan in every room for summer air circulation. A new rotary three-position switch, which adds to the decor of the room, controls the fan.

For additional data, ask for item H822, using coupon on page 100.

Trade-Wind

TRADE-WIND Motorfans, Inc., 7755 Paramount Blvd., Rivera, Calif., a leading manufacturer of kitchen and small room ventilators, has entered the electrical heating field with a line of radiant wall insert heaters.

The new heaters have been designed to combine both radiant and convection heating. A multi-louvered

grille gives unobstructed radiant heating and at the same time accelerates convection heating.

Other features of the Trade-Wind heaters include an entirely new simplified mounting bar assembly which makes installation and alignment quick and easy and eliminates headers. Separate top and bottom mounting bars are located and nailed between the joists. The heater housing rides on these bars for horizontal positioning. The bars also provide the correct distance for either plaster or dry wall construction. The housing itself snaps into place by means of spring buttons.

The Trade-Wind line includes two sizes, 45" high by 6¾" wide and 15" high by 10¼" wide, which are available with built-in thermostat or with "on-off" switch control. Wattage ranges from 1300 to 1650 using 115 volts a-c. A large model drawing 2000 watts operates on 220 volts a-c.

For additional data, ask for item H823, using coupon on page 100.

Meier

THE 52-year-old Meier Electric and Machine Co., Inc., Indianapolis Ind., have available a complete line of electric heating equipment to fit most every application for home, office, commercial, and industrial applications.

Recessed wall heaters, with individual thermostats, are manufactured in nine sizes ranging from 1000 watts to 6000 watts. Nylon radiant heat cable, for both dry wall and plaster installations, is available in 25 sizes, ranging from 250 watts to 5000 watts. Two types of 220 volt portable heaters, both cone type and enclosed elements, in 2000, 3000, 4000 and 5000 watts will completely satisfy many hard-to-heat areas such as offices, enclosed breezeways, basements and second or third-floor remodeled areas.

Regardless of the type of heating system, every home should have a bathroom heater—to eliminate the need of firing up the central heating system on the cool days of spring, summer and fall. Bathroom heaters are manufactured in three sizes (1000, 1350 and 1625 watts) with on-off switch or thermostat.

Baseboard heating, evenly distributing the warm air throughout the room, is fast becoming the most popular and modern type of heating system. Manufactured in three sizes (500, 750 and 1000 watts) the Meier baseboard units incorporate many features which are advantageous to both the contractor and the user.

Compact in size, only 6" high and 2½" deep, and painted a pleasing neutral-colored Hawaiian tan hammertone, the Meier baseboard units will fit into most every type of room decoration. However, if the customer so desires, the units may be painted with a good grade of enamel to match the existing woodwork. The "floating," totally-enclosed strip heater eliminates the objectionable cracking and popping found in most units during the heating cycles.

The built-in, thermal type cutout, a most important feature, eliminates the possibility of fires or scorching of drapes or curtains whenever they are pulled over the face of the heater. With two prime heating surfaces and eight secondary heating surfaces, (approximately 450 square inches per foot of panel) an even, comfortable

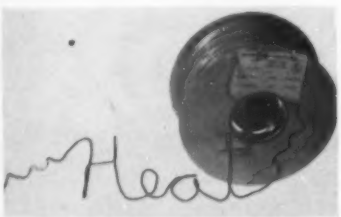
flow of heat throughout the room is acquired. Temperature differential, between floor and ceiling very seldom runs over two degrees. The low surface temperature of the units allows complete freedom in the placement of furniture. The heated air leaving the front of the heater, rises 2½ inches away from the wall completely eliminating the streaking of walls.

Every baseboard heater has a thin-wall raceway the complete length of the unit, for ease in wiring of continuous runs.

For additional data, ask for item H824, using coupon on page 100.

Dixie Raydiant

DIXIE Raydiant Electric Heat Corp., 66-11th St., N.E., Atlanta, Ga., is now manufacturing a complete line of Dixie Ray ceiling cable. Wattages run from 400 to 4400 watts, and its nylon jacketed cable is UL approved for either dry wall or plaster construc



tion. This eliminates the necessity of a distributor's stocking two different types.

The White Rodgers thermostat, now supplied by the majority of cable and glass panel manufacturers, is also available with the "Dixie Ray" label. This popular line voltage thermostat will handle up to 5000 watts, which, of course, is more than

most rooms require even if they are quite large.

Dixie Raydiant, since 1954, has made its own complete line of "Dixie Ray" glass panels. The exclusive frame design, which completely eliminates wall discoloration, is used throughout the entire line of panels ranging from 450 watts to 1500 watts. All wall panels are UL approved.

In addition to cable and surface panels, Dixie Ray offers a complete line of recessed panels for new construction or remodeling, and also a ceiling panel.

Other special features of the Dixie Ray panel are a truly sensitive thermostat; keyholes so that the panel can be simply, yet firmly, hung flat and snug on the wall with no cutting of the wall whatsoever; anchored leads to protect the terminals; knockouts on bottom of frame as well as rear; twist-on junction box with clamps; and inner carton protective packing.

For additional data, ask for item H825, using coupon on page 100.

Titan

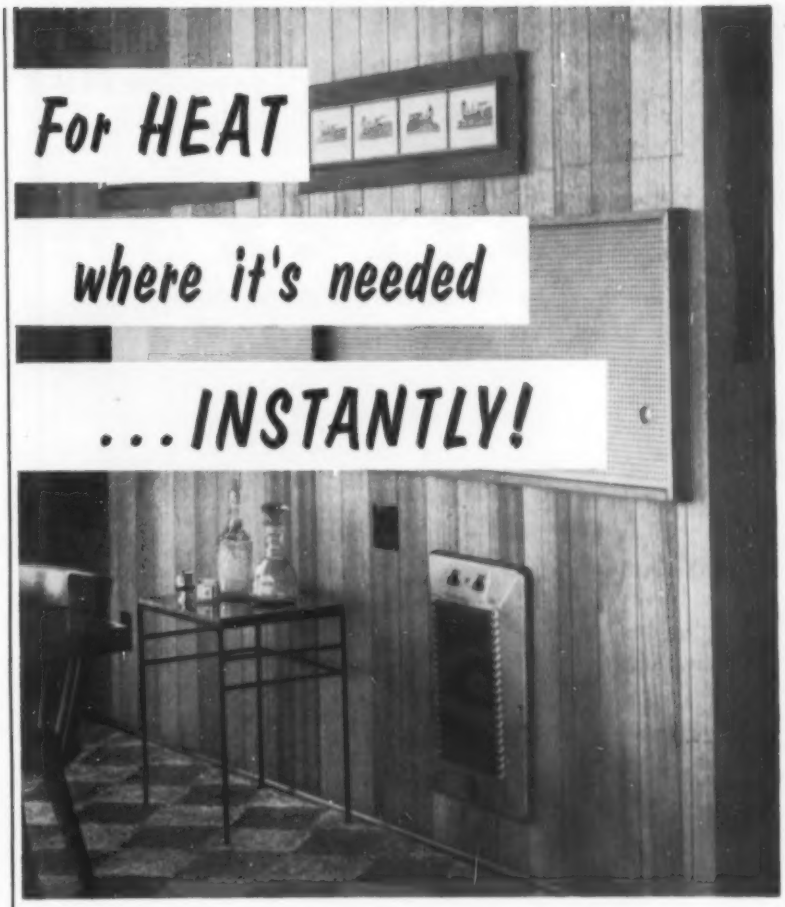
THE HIGH WATTAGE field of electric space heaters has been entered by Titan Sales Corp., Buffalo 10, N. Y., with a complete line of portable electric heaters of smart design and room penetrating heating efficiency.

The new Titan Hi-Watt heaters embody Titan's modern styling and attractive pearlized two-tone baked or enamel finishes. Especially important

is the fact that Titan guarantees the element of these Hi-Watt heaters unconditionally for 10 full years.

Titan Hi-Watt heaters are available in three models rated 3000, 4000, and 4600 watts. All operate on 220 volts.

Titan Hi-Watt heater's unique features include: convenient, black molded carrying handle; Titan's famous Ever Cool case that remains cool to the touch regardless of how long the heater is in operation. Other features are the live power signal indicator which remains on from the moment the heater is put into opera-



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Bilt-in Electric Wall Heaters

"Master Duty" Wall Heat-Fan

Thermador Electric Wall Heaters satisfy all the heating demands of your buyers. A flick of a switch instantly delivers a surge of clean, healthful warmth. Scientifically designed heating element, fan and louvers direct the heat toward the cold floor. From there the heat rises, warming the "Living Zone"... quickly, safely, economically. Room-by-room heat control allows heating of just those areas where heat is desired. Heat your homes with Thermador ... so efficient ... so clean ... so easy to install ... and the fastest heaters made! There's a type and size for every room.

Fan or Radiant Models • Convenient Top Switches • Optional Thermostat Control • Sun Bronze, White or Stainless Steel Finishes On-Off Indicator Lights • Approved by Underwriters' Labs., Inc.

"Medium Duty" Wall Heat-Fan

Bathroom "Head-to-Heels" Radiant Heater

Bathroom "Space Saver" Radiant Heater

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A Division of Norris-Thermador Corporation
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Manufacturers of Bilt-in and Console Electric Ranges, Electric Water Heaters, Evaporative Coolers, Ventilating Fans.

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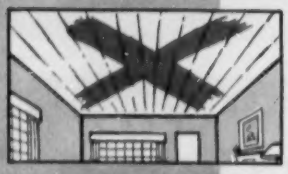
Tuffex is 2½ times as resistant to mechanical damage. Homogeneous, hard and tough insulation increases tensile strength. So ductile it bends on any angle without harm.

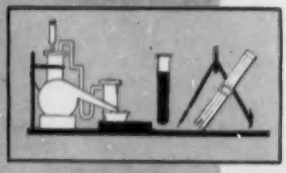
DUAL-PURPOSE

Tuffex is specifically built for **both** plaster and dry-ceiling applications. It is virtually unaffected by heat-aging.



STREAK-RESISTANT

Eliminates the need for a jacket to "bottle up" this characteristic. Streaking is combatted **in the insulation itself.**



PROVEN QUALITY

Extensive and exhaustive laboratory tests indicate a durability up to 3 times that of other cables.

Complete Everwarm Tuffex Line Ready Now!

EVERWARM

The top-profit Everwarm line includes special purpose radiant cable for plaster or dry-ceiling construction . . . and radically new Wall Heaters with "Guide Ray" cone design.

New Tuffex 240-volt cable is available in steps of 200 watts, from 400 to 2000 watts; steps of 250 watts to 4500. 120-volt cable in varying wattages from 300 to 1500. Backed by Everwarm factory guarantee.

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UL EVERWARM 5 YEAR GUARANTEE

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tion until it is turned off. This gives visual indication of the heater being on, even in a darkened room.

To control the heat, the Hi-Watt heaters have Therm-O-Dial controls. This precise thermostatic control turns the heater on and off automatically while keeping the room at the pre-selected temperature.

Another important feature is Titan's temperature limit control: In every Hi-Watt heater is a special temperature control which will shut the heater off automatically in the event it is inadvertantly tipped over or if the air circulation through the heater is impeded or impaired causing excessive heat to concentrate within the heater case.

Hi-Watt heaters are listed by the Underwriters Laboratory, and are guaranteed against any defects in workmanship and materials for one full year.

For additional data, ask for item H826, using coupon on page 100.

Wesix

EXCLUSIVE with Wesix Electric Heater Co., 390 First St., San Francisco, the new Ionix wall convector with controlled radiation features both ionization and air purification to destroy air-borne bacteria, mold and pollen spores and make indoor air like outdoor air at its best.

Heating elements are supported for their entire length in rounded ceramic grooves and are guaranteed

for 10 years against burnouts. The heating cores and the cylindrical baffles, through "chimney" action circulate the air for even heat distribution throughout the room. A filtering action exerted on the circulating air by the Ionix Wall Convector destroys air-borne bacteria, mold and pollen spores.

Completely automatic, the Ionix wall convector features a combined bi-metal thermostat and switch for accuracy of temperature control plus safe sure switching which discon-

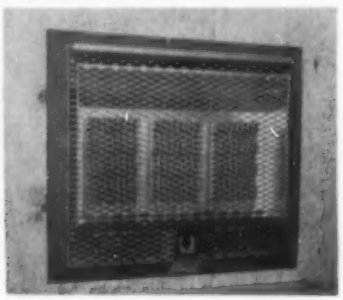
nects both sides of the line. Sizes from 1000 to 8000 watts are being made. Finish is hammertone bronze with special finishes and voltages available. Underwriters' Laboratories listed and approved.

Wesix also makes a complete line of portable and built-in units for residential and commercial use, including ceiling cable, baseboard panels, bathroom heaters, thermostats, load regulators, duct heaters and wall heaters.

For additional data, ask for item H827, using coupon on page 100.

Matthews

TWO SERIES of wall heaters, the FW and FW-1 in 1500, 2000, 3000 and 4000 watts, are manufactured by Matthews Manufacturing Co., Albertville, Ala. Both are available in gray or brown hammertex baked enamel. The FW-1 series has the same cabinet, frame, grille and thermostat as



the FW series, the only difference being in the shape of the element. Both series have the same guarantee of five years on the element and 18 months on the thermostat. The FW-1 series runs slightly lower in cost, and is the newer design. Both are UL approved and both have a chrome steel intercasing.

The company also makes a floor furnace line which is available in a 3000, 4000, 5000, 6000 and 8000 watt sizes. The floor furnace elements and thermostat carry the same guarantee as the wall heaters.

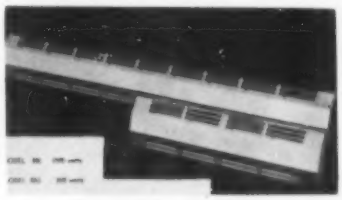
For additional data, ask for item H828, using coupon on page 100.

Crystalheat

AN ELECTRIC baseboard radiant/convector perimeter heating system has been developed by Crystalheat Co., 14761 Keswick St., Van Nuys, Calif.

Crystalvector is the latest innovation in perimeter heating systems. It was made to replace the conventional baseboard with eye appealing heaters. A perfect combination of penetrating radiant and gentle convection heat furnishes a curtain of warm air on outside walls and windows to counteract down drafts and cold floors. Crystalvector provides this comfort with perfect safety and at a moderate price.

These radiant/convector baseboard heaters are available in modular lengths of four feet rated at 1000



watts—3415 Btu's and two feet rated at 550 watts—1880 Btu's at 220/240 volts. A built-in 115 volt wall receptacle is styled to become a part of the regular baseboard heater and is available as an accessory. Floor lamps and other appliances can be plugged into these built-in outlets.

The heavy duty (fin-tube) electric heating element is built to last a lifetime, eliminating maintenance costs over the years. Crystalvector features easy installation and is a great improvement in this most popular method of electric heating.

For additional data, ask for item H829, using coupon on page 100.

Heetaires

A NEW LINE of heavy-duty wall-insert and wall-attachable automatic Fan-Forced Heetaires with 2000 to 5000 wattages has been put on the market by Markel Electric Products, Inc., and LaSalle Products, Inc., Buffalo.

These new heavy-duty automatic Heetaires (Series H270-GT) are designed on the modern shadow box

principle and engineered on the approved perimeter heating principle.

These Heetaires have powerful 7¾-inch fans that steadily and uninterruptedly force the currents of cool air over the high-quality, long-lived resistance coil wire heating elements. These elements, that operate at low temperature, heat the cool air which is then fan-driven into the room.

Various models (2000 to 5000 watts, 240 volts a-c) permit flats, apartments, small homes, motels, garages, and, of course, the largest size rooms to be completely heated.

A simple dial controls the heavy-duty automatic Fan-Forced Heetaire—to produce and maintain any desired temperature between 40° and 85° F. The thermostat turns the Heetaire on and off as necessary The heavy-duty thermostat is located in the air stream to accurately control the temperature.

If the flow of air through the Heetaire is obstructed in any way, a safety switch automatically breaks the circuit; it is reset automatically.

The lifetime sealed motor is positioned distant from the heating elements so as to run cool. The fan draws the cool air over the motor to keep it cool. It runs quieter too—because its special resilient mounting reduces vibration.

These heavy-duty automatic fan-forced Heetaires have a special access door through which the main connection to the feeder line can be inspected and serviced without removing the Heetaire from the wall.

In addition to the heavy duty wall insert and attachable Heetaires, the company makes a ceiling type radiant Heetaire and a line of automatic and manual wall radiant Heetaires.

For additional data, ask for item H830, using coupon on page 100.

Berko

INCREASED wattages and improved design that reduces installation cost are features of the Berko glass radiant heating unit that enable the electrical contractor to equip the average home with high quality radiant heating at a cost that is competitive with the lowest priced open coil units, reports Berko Electric Manufacturing Corp., of 212-40 Jamaica Ave., Queens Village 28, N. Y.

The line includes a 2000 watt and 3000 watt unit, both available either with built-in thermostat or for use with wall mounted thermostat. These units include a tempered Pyrex brand glass unit with an electrically conductive coating which assures uniform heat. Installation is facilitated by elimination of need for junction box, the heater having knockouts on back and bottom for direct cable or conduit connection. These units are available only for 240 volts.

The Berko line also includes a 1250 watt unit available for operation either on 120 volts or 240 volts. This unit is similar in other respects to the 2000 watt and 3000 watt units, and is made with built-in thermostat or for

operation from wall mounted thermostat.

Newest addition to the Berko line is a small 750 watt recessed glass radiant heater especially suited to bathrooms, dressing rooms, small dens, ticket booths, etc. It is available in either the 120 volt or 240 volt rating but comes only with built-in thermostat. Construction features are similar to the other units of the line except that this model is designed for recessed installation.

Additional information on the complete line as well as availability for special voltages may be obtained by writing the manufacturer.

For additional data, ask for item H831, using coupon on page 100.

Preway

PREWAY INC., of Wisconsin Rapids, Wis., long known for quality appliances under the name of Prentiss Wabers Products Co., is now marketing a versatile electric space heater known as the "Vectaire."

Based on the jet convection principle, Vectaire produces a steady stream of heated air averaging 135

feet per minute in velocity. The Vectaire has no moving parts, hence is entirely silent in operation. Its exterior case its always cool, safe for children to touch when it is on. The portable model can be moved while in operation since it is cool to the touch and a special hand grip formed in the case makes it simple.

The portable Vectaire is available only in the 1500 watt rating for 120 volt operation, either thermostatically controlled or manually operated. However, Preway engineers are now creating special "in-the-wall" models for new construction and remodeling applications. These units will be available within three or four months.

For additional data, ask for item H832, using coupon on page 100.

New literature on electric space heating equipment

Chromalox

Literature is now available from Edwin L. Wiegand Co., 7500 Thomas Blvd., Pittsburgh 8, Pa., covering the complete line of Chromalox heating units, including electric baseboard heaters, radiant bathroom heaters, radiant wall panels, fan-driven wall insert heaters, and electric ceiling Thermwire. Complete descriptions, illustrations, and specifications are given on each of these heating units.

For additional data, ask for item H833, using coupon on page 100.

Westinghouse

The new Westinghouse Electric Heating Guide B3768B provides complete information on the design of electric heating systems, including easy-to-read charts for quick, accurate calculation of heating requirements. Consideration is given to such important factors as room size, type and amount of insulation, number and size of windows and doors, room exposure and climatic conditions.

The Guide contains information on Westinghouse electric heating units and copies may be obtained from Westinghouse representatives or Westinghouse Electric Corp., Sunnyvale, Calif.

For additional data, ask for item H834, using coupon on page 100.

Wesix

A 15-page Residential and Commercial Air Heating Equipment catalog has been issued by Wesix Electric Heater Co., 390 First St., San Francisco, Calif. Included in the catalog are specifications and illustrations of Wesix-Ionix wall furnaces, baseboard panels, bathroom heaters, portable heaters, bracket type heaters, wall fan type heaters, floor furnaces, and ceiling heat cable.

Also available from Wesix is a presentation of the facts about modern electric heating entitled Design for Modern Electric Heating. The 31-page booklet discusses electric heat cost in representative areas, choosing the right electric system and individual heating units, designing your home for electric heat, system controls, and how to use electric heat in remodeling. The booklet is well illustrated and can be used as a sales aid.

For additional data, ask for item H835, using coupon on page 100.

Heatmore

Heatmore, Inc., 59 Throop Ave., Brooklyn 6, N. Y., has available a four-page, easily readable black-on-white catalog which includes a general discussion of electric radiant heating, a short description of each series of Heatmore ceramic panels, as well as detailed specifications and installation facts. Profusely illustrated, each model is shown not only in close-up but also in an actual installation. The Heatmore line features ceramic radiant heat panels and includes baseboard, bathroom, wall-mounted, ceiling and portable models.

For additional data, ask for item H836, using coupon on page 100.

Ceilheat

The Radiant Cable Manual, a 23-page color brochure, is now available from Ceilheat, Inc., 5212 Homberg Dr., Knoxville, Tenn. The manual contains information on the principle of radiant heating; how to install Aristocrat cable for plastered ceilings, Dri-Ceil cable for dry-wall construction, and Ajax cable for concrete floors; and how to determine heating load, cable size, and spacing.

Also included is a comparison of the overall cost for heating a six-room house with radiant cable and two other types of heating fuel.

For additional data, ask for item H837, using coupon on page 100.

Electromode

Complete line of electric heaters for the home is described in new full color, beautifully illustrated literature just issued by Electromode Corp., Rochester 3, N. Y., manufacturer of electric space heating equipment.

In folder form, it opens up to a striking display of wall and portable heaters for big rooms and small rooms, radiant panel and baseboard heaters, and ceiling radiant cable

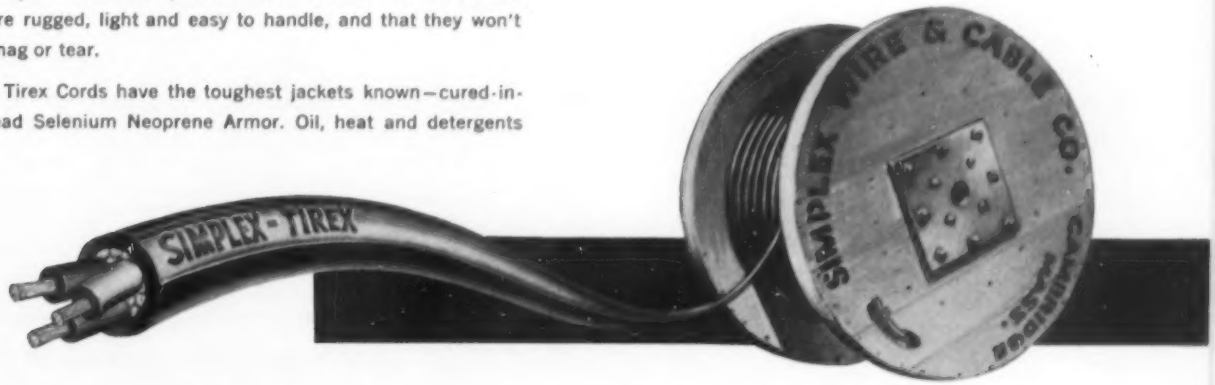
construction men who are "on the beam" endorse Simplex-Tirex Cords

Men who work with tools day in and day out develop a sort of special respect for equipment they know they can depend on. It's not at all odd, either, for such equipment helps them do their jobs more efficiently.

Workers who use portable electric tools recognize SIMPLEX-TIREX CORDS as tried and true helpers-on-the-job. They know from experience that SIMPLEX-TIREX CORDS are rugged, light and easy to handle, and that they won't snag or tear.

Tirex Cords have the toughest jackets known—cured-in-lead Selenium Neoprene Armor. Oil, heat and detergents will not harm them, and they stand up under hardest abuse.

Simplex-Tirex Cords for riveters, drills, saws, grinders, polishers, etc., are available from your electrical distributor. For complete details and specifications write today for our Booklet 1011. **SIMPLEX WIRE & CABLE CO.**, 79 Sidney Street, Cambridge 39, Massachusetts.



heat, with actual installation illustrations in color. Also contains interesting facts regarding complete or supplementary home heating by electricity. Write for your free copy of Form EC-165.

For additional data, ask for item H838, using the coupon below.

Heetaires

An A.I.A. folder (File No. 30-C-44) is available from Markel Electric Products, Inc., Buffalo 3, N. Y., containing descriptive literature on the company's electric space heating products. Included are folders on the Heavy Duty Automatic Wall Insert and Attachable Heetaires in 2000 to 5000 watt sizes, the Ceiling Radiant Heetaires in 1000 and 1250 watt sizes, and the Automatic and Manual Wall Radiant Heetaires for auxiliary heating. Copies are available upon request to the company.

For additional data, ask for item H839, using the coupon below.

Electrend

Electrend electric forced air heating systems are illustrated in a new folder available from Electrend Products Corp., St. Joseph, Mich. A section is devoted to an explanation of the counter-flow principle employed in this system. A wide range of unit sizes to fit any particular need is shown and described. Also included are descriptions of a portable unit, the hydraulic-action thermostat, and a specifications chart.

For additional data, ask for item H840, using the coupon below.

Dixie Raydiant

A comprehensive 28-page catalog containing all data on the 18 Dixie Ray electric glass panel heaters is available from Dixie Raydiant Electric Heat Corp., 66-11th St., N. E., Atlanta 9, Ga.

Installation instructions for electric ceiling cable along with the various sizes are also available. Dixie Ray cable is UL approved for both sheetrock and plaster ceilings.

For additional data, ask for item H841, using the coupon below.

Matthews

New Air Flow electric wall heaters are fully described and illustrated in literature available from Matthews Manufacturing Co., Albertville, Ala. Cleaning steps, installation notes, and specifications are included on the UL approved Crescent-Core wall heaters, now available with portable casings; standard and deluxe portable heaters; and the completely automatic Air Flow floor furnace.

For additional data, ask for item H842, using the coupon below.

Meier

Detailed descriptive information in the form of a 12-page colored catalog, envelope stuffers, and pricing information is available from Meier Electric and Machine Co., Inc., 3525 East Washington St., Indianapolis, Ind. Also available is a newly designed Determinator—a simplified method of accurately figuring the heat loss and heating costs for the home.

For additional data, ask for item H843, using the coupon below.

Cavalier

The "Cavalier Electric Heat" catalog, a 12-page illustrated color folder, offers helpful suggestions for choosing and installing the best type of electric heat for new or old homes. Data on wall heaters, portables, floor furnaces, stainless-steel-and-aluminum bathroom heaters, and space saving electric baseboard is included.

Also available from Cavalier Corp., Electric Heating Division, Chatta-

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FOR MORE INFORMATION—Use this handy return coupon for requesting additional information on products listed or bulletins announced. Be sure to give your firm name and your position or title. You may request additional information on Utility Products, page 82-84; Electric Heating Products, page 88-101; or New Electrical Products, pages 120-123. Write in product numbers in coupon spaces below.

ELECTRICAL SOUTH
806 Peachtree St., N.E.
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August, 1956

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Please send me additional information on items mentioned in this issue of Electrical South. I have listed the key numbers of these items at right.

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☐ Enter my subscription to ELECTRICAL SOUTH and bill me at the special rate of three years for $3.00

nooga 2, Tenn., is a "Special Advantages" folder which gives important tips on cost of electric heat, where to install, etc., as well as outlining important features to look for when selecting an electric heating system for your home. It also pictures the complete Cavalier line o electric heating equipment.

For additional data, ask for item H844, using coupon on page 100.

General Electric

General Electric's new "Installation Manual for Electric Radiant Heating" is complete with diagrams, charts and "How-To" photographs that demonstrate in step-by-step fashion the procedures to be followed in the installation of electric radiant heating. After strongly emphasizing the importance of adequate insulation and its proper application, the manual tells how to install G-F electric radiant heating on both plaster ceilings and laminated gypsum wallboard ceilings.

In addition to presenting easily-followed installation instructions, th G-E manual offers practical suggestions for finishing ceilings after the heating wires have been stapled in place, checking and testing the electrical installation, and—where necessary—localizing damage and making repairs.

The final section of the manual deals with electric radiant heating installation in concrete floors.

Copies may be obtained from the Wiring Device Department, Genera' Electric Co., Providence 7, R. I.

Also available from General Electric is a "Design Manual for Electric Radiant Heating." Compiled primarily for architects, heating engineers, estimators and contractors, it simplifies calculations that are necessary prior to the installation of electric radiant heating.

Starting with fundamental facts regarding transmission and infiltration heat losses, the manual goes on to outline step-by-step procedures for determining service entrance equipment requirements, annual operating costs, minimum heating wire requirements, and proper wire spacing.

Several maps and charts are employed to assist the reader in computing equipment needs and estimating costs in various lacalities. Consideration is given to special insulation and heating requirements in different types of home construction. This and other data in the manual provide, in simplified form, the essential information for everyone concerned with home heating design.

Copies of the "Design Manual for Electric Radiant Heating" can also be obtained from the Wiring Device Department, General Electric Co., Providence 7, R. I.

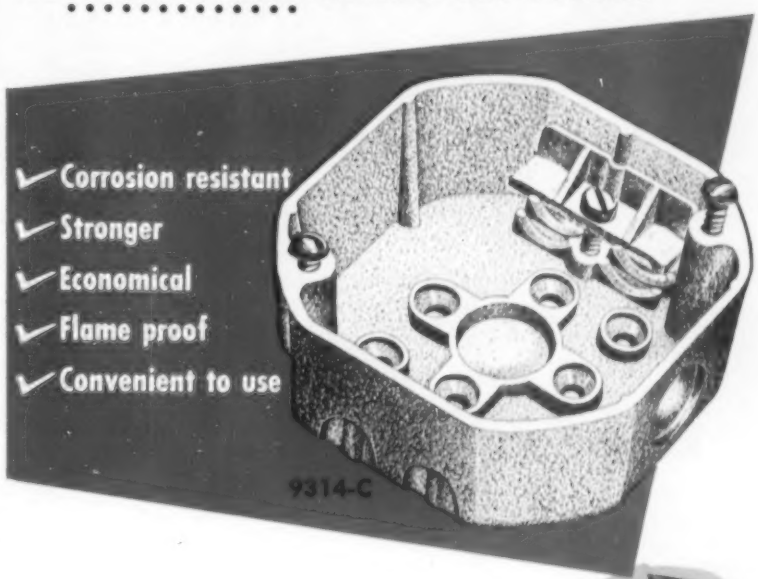
For additional data, ask for item H845, using coupon on page 100.

Porcelain Products introduces

a Brand New Concept

...OUTLET BOXES

of Fiber Glass Reinforced Plastic



The *newest* product offered to the electrical industry . . . Porcelain Products "FRP" outlet boxes provide the *EXTRAS* . . . not found in any other type. Molded of fiber glass reinforced polyester, with standard round knock-out holes and non-metalic clamps (if desired), it combines the strength and lasting qualities of steel . . . with the desirable electrical properties of plastic. Porcelain Products "FRP" outlet boxes are *ideal* for replacement or new construction . . . especially where moisture or corrosive atmosphere is present. Contact your electrical wholesaler or write direct for further information and catalogs.

FARM BUILDINGS

HOMES

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62 years

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PP INC

FINDLAY, OHIO

News of the industry

edited for Southern readers

OG&E president new head of EEI

THE PRESIDENT of Oklahoma Gas and Electric Co., Donald S. Kennedy, was elected president of the Edison Electric Institute at the conclusion of the institute's annual meeting held in Atlantic City recently.

Mr. Kennedy has been associated with OG&E since 1923, joining the

company as a clerk shortly after his graduation from the University of Arizona with a degree in accounting and economics. He was soon promoted to traveling auditor and later auditor of the company's Eastern Division.

In 1940 he was appointed assistant treasurer of the company, and in 1942 was elected treasurer, and member of the board, and a vice-president, which positions he held simultaneously.

Mr. Kennedy was advanced to the position of executive vice-president in 1947, and in 1949 was elected president and chairman of the board, succeeding George A. Davis, who had just retired.

Two industry shows set for Washington, D. C.

TWO IMPORTANT Expositions, one aimed at Mr. and Mrs. Homeowner-Mr. and Mrs. Apartment-dweller; and the other to an audience of key purchasing personnel, engineers, and electrical contractors, were announced at a press luncheon at the Pepco Playhouse by William G. Hills, managing director of the Electric Institute of Washington, sponsor of both events.

The first show, an Air Conditioning, Ventilating and Electric Space Heating Exposition for home-owners and apartment-dwellers, will take place February 8, 9, 10 at the Sheraton Park Hotel. Admission will be free.

The second show, The Electrical Trade Conference and Exposition, will take place February 12, 13, 14 at the Shoreham Hotel. This event will be put on by the leading manufacturers of electrical equipment used mainly for commercial purposes. It will, in effect, be a trade show for electrical contractors, utility men, engineers, etc. Admission to this show is also free.

In discussing the twin Expositions, which have already drawn a good deal of attention among electrical people, Mr. Hills said, "With the tremendous expansion of the Washington Metropolitan area in the past few years, home owners and apartment-dwellers are taking a keener interest in air conditioning their living quarters with either portable air conditioning, central cooling, central heating systems, attic ventilating systems, electric space heating, heat pumps, window fans or year round systems."

Mr. Hills continued, "Our Show on February 8, 9, 10 at the Sheraton Park will enable the public to see, compare, and ask questions from experts about the leading air conditioning, ventilating or electric space heating equipment. It will all be here in one place and at one time."

Speaking about the Electrical Trade Conference and Exposition, Mr. Hills asserted, "Washington is the hub of government specification writing and buying; and has by far one of the largest concentrations of heavy construction. This trade show for manufacturers, therefore, offers them a golden opportunity to present their new equipment, materials and services to a select group of important people in the Washington, Baltimore and Richmond areas."

Mr. Hills added, "Manufacturers of industrial electronic equipment, controls, motors, motor drives, heavy panel boards, commercial lighting, electric strip and immersion equipment, safety devices and other allied electrical equipment will exhibit their products and services."

Mr. Hills said further details will be released from time to time Several luncheons at the Electrical Trade Conference will feature well known speakers.

Lighting certification underway in New Orleans

THE "MACHINERY" for the lighting certification program has been set in motion by the Electrical Association of New Orleans, according to report from W. E. Clement, director of publicity.

Eligibility of a lighting installation for certification is based on intensity of illumination that meets or exceeds the footcandle standards contained in the "Manual of Certified Lighting" developed by the National Lighting Bureau.

The Electrical Association of New Orleans has just completed a Certified Lighting Training Course held in connection with the local certification activity, and 38 certificates of satisfactory completion have been issued to 38 men who enrolled for the course.

To facilitate the handling of lighting installation certification, the association has appointed four representatives, each being assigned a portion of the Greater New Orleans area. Those seeking certification for an installation must first fill in a "Request for Certification" form; this is submitted to the association representative in charge of the area in which the installation is made; the representative checks the installation, recommends it for certification if it complies with the required standards, and presents the certificate and a decalcomania which can be posted to mark the job "Certified Installation."

Highway lighting program discussed at conference

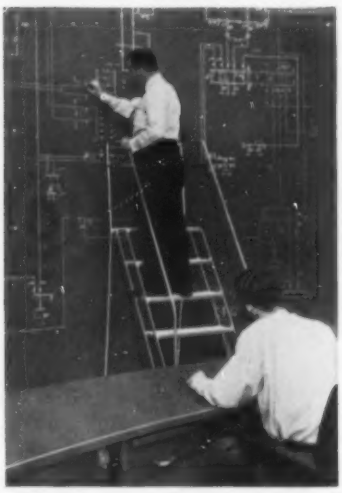
THE ROLE lighting will play in the planned multi-billion dollar national highway program was discussed before more than 100 representatives of utility companies and municipalities at the 1956 General Electric Street Lighting Conference at Nela Park recently.

The men, who came from all over the country, heard General Electric engineers from the Outdoor Lighting Department at Hendersonville, N. C., and lighting experts from the G-E Lamp Division at Nela Park outline new developments and trends in the street lighting field.

The safety and comfort of the public were the recurrent themes of the speakers who covered the

This new Systems Operations Center of the Jersey Central Power & Light Company keeps in touch with remote stations through Bell System channels for telemetering and remote control.

Bell System communications help Jersey Central regulate power transmission



Colored pegs in wall diagram indicate segments of line to be isolated for maintenance work.

Channels for telemetering and remote control enable the Jersey Central Power & Light Company to regulate power transmission every step of the way from generator to home, store and factory.

An engineer glances at the dials, which give him a running picture of the system and the changing demands he has to meet—information which has been brought to him by Bell System telemetering channels.

From his position, he switches loads, starts and stops generators and localizes failures—even at distant points—over a network of remote control channels provided and maintained by the Bell System.

If you would like to know more about how Bell System communications can help you, an engineer will be glad to survey your company's needs. There's no obligation. Why not call your Bell Telephone representative today?

BELL TELEPHONE SYSTEM

Private Line Telephone, Private Line Teletypewriter
Channels for: Data Transmission, Telemetering, Remote Control, Telephotograph, Closed Circuit TV

field of street and highway lighting from its use on the nation's super-highways to residential and business streets.

The drop in the use of the nation's highways at night—because of dangers and discomfort of inadequate street lighting — was likened to an investment of billions of dollars which draw no interest during 50 per cent of the time. Thus, the billions of dollars invested in the nation's highways are returning little or no interest at night because of the low traffic volume caused in large part by inadequate lighting.

Several speakers traced the development of lighting on the nation's turnpikes from the early days in the 1930s, when no lighting budget was included in the cost estimates, until now when lighting is recognized as an integral part of highway construction.

There is still a long way to go in turnpike lighting, it was pointed out, because most turnpike lighting is still confined to service areas, bridges, entrances and exits.

Kirk M. Reid, of Nela Park, was chairman of the morning session when technical subjects ranged from straight series ballastless Mercury lamp circuits to various types of control systems. The subject of ballasts was under the chairmanship of K. D. Tobin, of Hendersonville.

Vast service center planned by Vepco

NOW IN advanced planning stages is a million dollar service center for the Virginia Electric and Power Co. The facility will be located at Richmond where Vepco has its system offices. The project will consolidate operations of system stores, repair and maintenance shops, salvage shop, and automotive shop. It will also house a satellite service quarters for the Richmond district.

The various departments will be located on a 35-acre tract that provides for a proposed commercial and industrial fireproof building covering 70,000 square feet. The building will be of an attractive design to conform with general community appearance. Offices will be located on a second floor of a part of the building.

Vepco vice-president Miles Cary says the need for such a facility has become increasingly pressing with the company's rapid growth. The centralization of functions at the new site was decided upon after lengthy consideration of its advantages as opposed to equipping several smaller district shops.

Mr. Cary commented on the various functions to be carried on at the central facility and the need that required its establishment. He said that the system storeroom is presently operated in conjunction with the Richmond District storeroom in a badly overcrowded building. The new storeroom will relieve present space limitations and provide for expansion of Stores Department operations consistent with the growth of the company. The new facility will provide 20,000 square feet of indoor storage space, with an additional 60,000 square feet of paved and fenced outdoor space. Only 20,000 square feet is available for all purposes at present.

Discussing the proposed system repair and maintenance shops, Mr Cary said that Vepco presently has 11 district shops which handle local maintenance and repair of equipment for distribution, substation and line departments. Practically all of these shops would have to have their facilities expanded and workloads increased if the new centralized set-up were not constructed, Mr. Clary pointed out.

He estimated that an annual savings of $150,000 will be realized through the operating economies of a central shop.

In discussing a further advantage of the service facility—that of housing a satellite service quarters in the Richmond District—Mr. Cary pointed out that the site of the new facility is seven miles away from Richmond District headquarters. The distance between, he noted, is largely through heavily traveled streets. The company proposes to base several service crews at the new sites for maintenance and construction work in areas surrounding that location. This will eliminate time-consuming travel to and from the present district headquarters.

G-E presents Duke Power first N.C. transformer

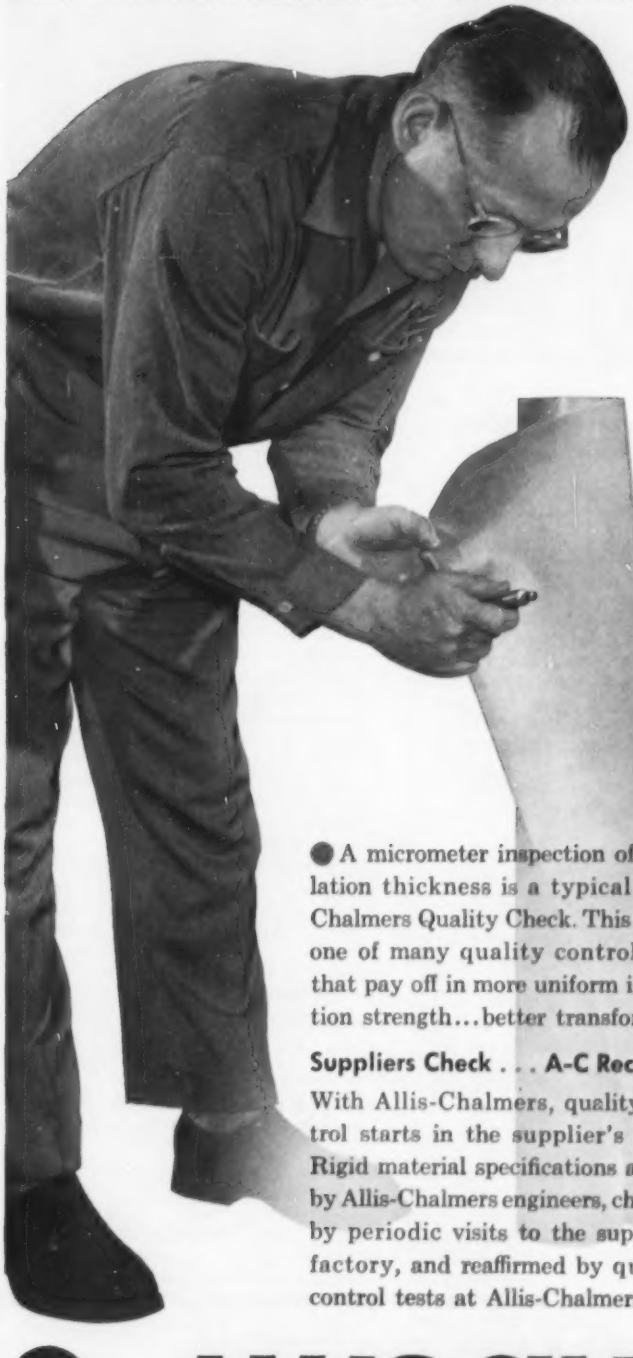
THE FIRST distribution transformer to be produced at the General Electric Company's new $20-million plant near Hickory, N. C., was presented to the Duke Power Company and was placed on display temporarily at the utility company's headquarters in Charlotte as a symbol of industrial progress in North Carolina.

Production of the first transformer came just one year after the first concrete was poured for the 400,000 square foot plant. A. C. Boisseau, plant manager, said the timetable for building the plant and putting it into operation is about two months ahead of schedule. Although all equipment will not be in place before 1956, production of transformers has started on a limited scale and will be stepped up gradually as more machinery is installed, Mr. Boisseau said.

Norman A. Cocke, president of Duke Power Co., accepted the first transformer at a brief cere-

William S. Ginn, left, general manager of the G-E Transformer Division, Pittsfield, Mass., presents the first transformer produced at G-E's $20-million plant at Hickory, N. C., to N. A. Cocke, center, president of Duke Power Co. A. C. Boisseau, plant manager, looks on.

Quality Control at Allis-Chalmers



A "Check" that pays off with longer transformer life

● A micrometer inspection of insulation thickness is a typical Allis-Chalmers Quality Check. This is just one of many quality control tests that pay off in more uniform insulation strength... better transformers.

Suppliers Check . . . A-C Rechecks

With Allis-Chalmers, quality control starts in the supplier's plant. Rigid material specifications are set by Allis-Chalmers engineers, checked by periodic visits to the supplier's factory, and reaffirmed by quality control tests at Allis-Chalmers.

For the Complete Story on quality control at Allis-Chalmers

. . . and what it means to you, call your nearby Allis-Chalmers office, or write Allis-Chalmers, Power Equipment Division, Milwaukee 1, Wisconsin for new Bulletin 61B8355.

ALLIS-CHALMERS

A-5047

money in the plant warehouse. William S. Ginn, general manager of General Electric's Transformer Division, Pittsfield, Mass., made the presentation. The 10-kva transformer, smallest of the various sizes to be manufactured in the new plant, bears a silver plaque identifying it as the first off the production lines.

Mr. Cocke, in accepting the transformer, expressed his company's gratification in having General Electric as a neighbor and said he thought it was "appropriate that the first transformer from the new plant, which eventually will ship transformers all over the world, should go into service in the area where it was born."

Mr. Ginn said that General Electric was especially pleased with the speed and efficiency with which the new plant has been built and placed in operation.

The Hickory plant is one of five General Electric plants now in operation in the Carolinas. Production began recently in the company's new outdoor lighting plant in Hendersonville, N. C., and in the electrolytic capacitor plant in Irmo, S. C. The company has operated an automatic blanket plant at Ashboro, N. C., and a lamp lead wire plant in Goldsboro, N. C., for several years.

Short metering course announced by MSMA

THE MID-SOUTH Meterman's Association will hold a meter school at the University of Tennessee in the latter part of March, 1957, it has been announced by C. R. Wardell, president of the association and superintendent of electric meters for the Knoxville Utilities Board. The school will last for one week and power companies in the South and Mid-South are invited to send one or more metermen to this short course on modern trends in metering.

Area representative appointments announced

TOMIC Sales and Engineering Co., Detroit, manufacturers of tap-on thinwall connectors, couplings and other electrical products, announce the appointment of the following representatives and the territories they will cover:

Richard M. Ong, P. O. Box 1325, New Orleans, La., who will cover Louisiana and Mississippi.

Tom Hodges & Co., 407 Broadway, Kansas City, Mo., who will cover western Missouri and eastern Kansas.

LIGHTING BRIGHTENS SHOW HOME—One of the big crowd stoppers at the Louisville Home Show was this model home with the principal of Inspiration-Lighting applied to the exterior by extensive use of Moe Light's new Garden Lights. Inside, the dining area was featured as being able to do more than one job by the use of a pull-down fixture.

L&P brochure contains picture tour of plant

THERE'S NO DOUBT that Light & Power Utilities Corp., Memphis, Tenn., is one of the fastest growing manufacturers of fluorescent light fixtures—not only in the South, but in the nation. Proof is in a handsome new brochure called "This Is Light & Power."

Richly illustrated, the brochure provides a complete "trip" through the recently enlarged and refurbished L & P plant and offices. The result is a comprehensive picture of how the makers of L & P fixtures have prospered since the first fixture came off the line in 1946.

Introducing the brochure is a letter by Murray Reiter, president, explaining that its purpose is to show how L & P fixtures are made "every inch of the way (even the dies!) under our own roof. On every page you'll see care, skilled craftsmanship and precision working to make some of the best fixtures available. You'll see how quality control assures dependability, how efficiency and multiple operations assure economy."

What follows is a picture tour of the plant—interesting shots of fixtures on the drawing board, dies being made, steel arriving at L & P's own siding. Then come pictures of the steps in basic manufacturing: giant shears are shown cutting the steel . . . press brakes form a reflector in the twinkling of an eye . . . multiple dies punch out complete units up to eight feet long in a single operation.

Moving on through the plant, the visitor-by-booklet sees spot welding, positive assembly, and everywhere stacks and stacks of fluorescent and slimline channels of all sizes and kinds, kept on hand to assure fast service on every order.

Next in the brochure come degreasing and phosphate coating to prevent rust and give better paint adhesion; spraying (with a top quality paint prepared to L & P's own specifications); testing, to check viscosity; and baking, to give baked enamel finish. After subassembly, fixtures are shown moving along L & P's new, automatic conveyor-lines for final assembly. (A Custom Department is also maintained to fill needs for drop shipment.) Then packing and loading, to complete the process from raw steel to final shipment.

Winding up the brochure are glimpses of the offices, staff meetings, and display and conference rooms. All in all, it's an attractive outfit . . . a tribute not only to Light & Power, but to the growing importance of the South itself in the lighting industry of the nation.

Sales promotion package for residential lighting

THE LIGHTING industry's mounting interest in residential light conditioning was brought into sharp focus recently with the introduction of a sales promotion package designed to help open up this relatively undeveloped market.

Offered to the electric utility companies as a sales tool they can pass on to the major elements of the industry in their areas, the "Light for Living" sales package

design advantages

OF FISHER-PIERCE

PHOTOELECTRIC LIGHTING CONTROLS

Any utility field man who has installed a Fisher-Pierce photoelectric control knows firsthand the many advantages of its clean, straightforward design. He appreciates, for example, time-saving plug-in installation of the one-piece electronic head; the ease, speed and safety with which he can handle compact F-P controls; the clean meter plate that has nothing to interfere with external wiring; the easily checked fuse. He knows the weatherproof glass enclosure design gives him quick, easy access to the control chassis; that he can orient an F-P control after mounting; and that component layout permits trouble-free servicing as well as maximum impulse strength. These advantages are important to the utility itself as well as the field man, since they mean rapid, low-cost installation and substantially reduced maintenance. Only F-P controls provide these advantages, *plus* these four other important features:

Series 64400

Series 63300C

COMPONENT QUALITY — Pre-aged, long life tubes • Wire wound potentiometer • Metal encased capacitors • Non-hygroscopic 1P39 phototube • Balanced armature Sigma sensitive relay.

PROTECTION — From surges and lightning, by linen-based bakelite sub-mounting chassis and proper component spacing Circuit and load fuses, and lightning arrestor • Fail-safe operation.

ADAPTABILITY — Three basic series and numerous models for all mounting requirements, operating voltages, load capacities and desired contact arrangements.

DEPENDABILITY — Proven by the thousands of F-P controls used by hundreds of utilities, over the past ten years.

Complete specifications and operating data are contained in informative F-P Bulletins, available on request. Or call the Fisher-Pierce sales representative in your area, for point-by-point proof of F-P superiority.

THE FISHER-PIERCE CO., INC.

59 Pearl Street, So. Braintree, Boston 85, Mass.

was announced by James C. Forbes, manager of market development for the General Electric Company's Large Lamp Department.

The package, Mr. Forbes said, includes advertising and promotion material that will be useful to builders, fixture manufacturers and distributors, and the portable lamp field. A separate kit has been prepared for each.

"We regard this package," he said, "as a contribution to the industry-wide Live Better Electrically and 'Housepower' programs. It is intended as a means of helping raise the standard of lighting in American homes. It is aimed at reaching the consumer through the various elements of the lighting industry, with the electric utility companies assuming their natural role as coordinators of the program."

All three kits inclue the best selling book, "How to Decorate and Light Your Home," written by E. W. Commery and C. Eugene Stephenson, both recognized experts in their respective fields. Mr. Commery is in charge of residential lighting for G-E and a Fellow in the Illuminating Engineering Society. Mr. Stephenson is a nationally known decorator and has twice been president of the American Institute of Decorators.

"The value of this book," Mr. Forbes pointed out, "is that for the first time anywhere the two most important problems in any home, decorating and lighting, are treated as a single unit."

The book has been on the market for some time in a hardcover edition selling for $6.75 and has outsold everything in its class, he said. Under the new sales plan, G-E is making the book available in a paperback edition that can be sold at a profit for 35 cents by furniture, department, fixture and portable lamp stores. They will be distributed through electric utility companies.

The "Light for Living" package is being made available to utilities through the G-E Lamp Division's district sales offices across the country.

Corrosion problems in utility industry

FOUR TECHNICAL papers discussing corrosion problems in the utility industry will be presented at a symposium during the October 23-26 meeting of South Central Region, National Association of Corrosion Engineers, at San Antonio. The symposium is one of six to be given. Among the technical committee meetings will be the organizational session of Unit Committee T-7D, Corrosion Coordinating Committee, South Central Region.

Papers in the utility industry cover problems in power plants, lead cable sheaths and pipe enamel coating. Among the other symposia likely to be of interest is one on cathodic protection with four papers.

The 4-day meeting includes numerous social events, an exhibition of corrosion control materials and equipment and business meetings of the South Central Region's standing committees and membership.

New FAEC Miami chapter selects officers, name

A MEETING OF members of the Florida Association of Electrical Contractors in the Greater Miami area was held recently to adopt a chapter name and elect officers. Over 30 firms have joined and a membership drive is under way.

Miami-Dade County Chapter, FAEC, is the name adopted by the new chapter.

State manager L. L. Dick installed Vernon Holloway as president. Other officers are E. C. Cornelius, vice-president; Paul Foster, treasurer; James Lowry, FAEC director; and Charles Powers, secretary-manager. The board of directors includes Fred Astor, Jr., E. H. Seaton, James Lowry, and the president, vice-president, and treasurer.

OG&E announces scholarship plan

THE Oklahoma Gas and Electric Company will offer three annual scholarships to sons and daughters of company members beginning next fall, Donald S. Kennedy, OG&E president, announced. Scholarships will be awarded to Oklahoma Baptist University, Oklahoma City University and Phillips University, with one scholarship going to each of these three Oklahoma colleges.

The scholarships will cover tuition and general fees for the full school year, including the summer term. Scholarships will be reviewed for renewal each year.

The purpose of the scholarship program is to stimulate and encourage children of company members to obtain a higher education. Selection of three applicants to re-

HENRY FORD II RECEIVES BUSINESS EDITORS AWARD—The Society of Business Magazine Editors' first annual "Voice of Business" award was given to Mr. Ford in recognition of his "making the most substantial contribution to industry in 1955 in leadership, in business ethics, and in making it understood that most businesses are conducted with careful regard for the public interest." Left to right are: Frank Tighe, editor, Motor Age; Paul Wooton, Washington, D. C. newspaperman and chairman of the society's executive committee; Mr. Ford; and Elridge Peterson, editor, Printers' Ink.

ceive scholarships will be made by the scholarship committee of the three schools.

IES elects new officers

MARSHALL N. WATERMAN, assistant commercial engineering manager of the Westinghouse Lamp Division, Bloomfield, N. J., has been elected international presi-

dent of the Illuminating Engineering Society, it was announced recently after a tally of mail ballots.

Other officers elected by the 8,300 members of the professional society, which is celebrating the 50th anniversary of its founding this year, include George J. Taylor, eastern sales manager of Day-Brite Lighting, Inc., New York, N. Y., vice-president; Richard G. Slauer, product sales manager, Fixture Division, Sylvania Electric Products, Inc., Wheeling, W. Va., general secretary; Joe B. Browder, sales manager, Georgia Power Company, Atlanta, treasurer, and Kirk M. Reid, manager, Application Engineering Department, General Electric Company, Cleveland, O., re-elected vice-president for a second term.

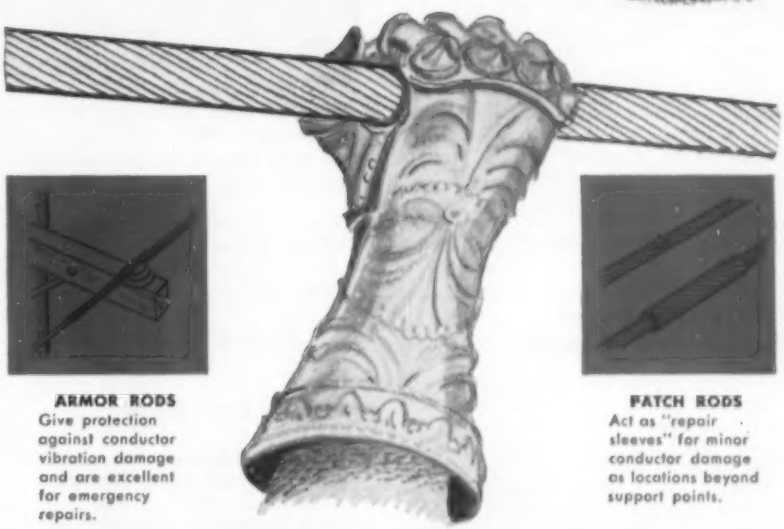
Five new regional IES vice-presidents also were elected. They are: Robert M. Taylor, dealer-builder relations manager, Toledo Edison Company, Toledo, O., Great Lakes region; Joseph A. Schneller, vice-president in charge of sales, Lighting Products, Inc., Highland Park, Ill., Midwestern region; Charles E. Waldron, street lighting advisor, Niagara Mohawk Power Corporation, Albany, N. Y., Northeastern region; Kenneth Reid, chief electrical engineer, Department of Electrical Engineering, City of Victoria, British Columbia, Pacific Northwest region; and Carlton M. Thompson, engineer in charge of commercial lighting sales, San Diego Gas and Electric Company, San Diego, Cal., South Pacific Coast region.

The new officers, whose terms

WHEREVER *Protection* IS NEEDED ON OVERHEAD CONDUCTOR LINES

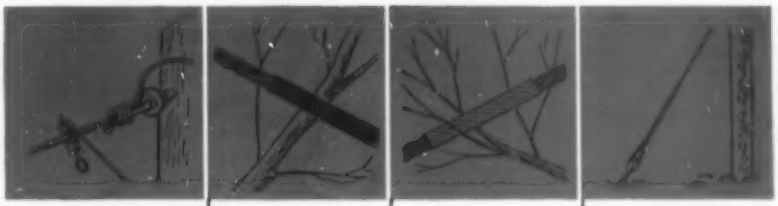
fine FANNER *Superformed* PRODUCTS

provide it better...easier...at substantial savings



ARMOR RODS
Give protection against conductor vibration damage and are excellent for emergency repairs.

PATCH RODS
Act as "repair sleeves" for minor conductor damage as locations beyond support points.



TAP ARMOR
Protective layer of shortened rods facilitate making taps without risking conductor damage.

PLASTIC FANNGUARDS
Tough, durable plastic sleeves used on covered wires for protection against tree abrasion.

ALUMINUM LINEGUARDS
Made to protect triplex cable or bare conductors against abrasion electrical damage.

FANNGRIPS
For a permanently positive grip on guy strand with maximum economy in material and labor.

Whenever you need accessory items for overhead distribution and transmission lines, you'll do far better by standardizing on Fine FANNER Superformed PRODUCTS. Each product in the FANNER Superformed line is precision manufactured to install easier and faster on the job. Careful packing insures safe delivery and simplified storage. Highest quality materials provide long life regardless of the type of installation. With all their extra features, FANNER Superformed PRODUCTS cost no more than ordinary products.

For full information on the Fine FANNER Superformed Line, write for literature and prices today!

Licensed for use under Patent No. 2,275,019

THE FANNER MANUFACTURING CO.
Electrical Products Division
Brookside Park Established 1894 Cleveland 9, Ohio

AGENTS AND DISTRIBUTORS IN PRINCIPAL CITIES

begin October 1, will be officially designated at the society's golden anniversary national technical conference which opens at the Statler Hotel, Boston, on September 17 and continues through September 21. Robert F. Hartenstein, Akron, O., now IES president, will preside at the introduction ceremony.

Gas turbine-steam plant approved by voters

VOTERS in Crisp County, in South Georgia, recently approved the issuance of $2,250,000 in revenue bonds to provide for the installation of a 15,000 kw combination steam-electric gas turbine generating plant which will supplant the power supply presently obtained from a county-owned hydro generating plant. The new unit, which will be the first of its type to be installed in this country, will be in operation within 18 months, according to W. Dan Sinclair, manager of the Crisp County Power Commission.

Jiffy Line agents appointed in South

APPOINTMENT of additional representatives in the South has recently been made by the Jiffy Line of Labor Savers, according to announcement by Clyde W. Lint. New appointments, and those appointed recently, include: Fred C. Baldridge Co., New Orleans, La.; George E. Clements, Towson, Md.; James E. McComack, Atlanta, Ga.; Clyde Mims & Associates, Myrtle Beach, S. C.; and C. E. (Red) Pitner, Knoxville, Tenn.

Mobile Showroom used by Houston firm

WITH A new lighting fixture mobile showroom, Starr Electric Supply Co., 700-6 Crawford St., Houston, Texas, has attracted a great deal of attention due to the fact that the innovation itself has created a lot of curiosity among the trade.

By leaving the display in an area for a couple of days and then calling back, there are usually several inquiries that can be followed up. Many contractors and builders have shown a great deal of interest in this method of selling.

The trailer is paneled in beautiful ash and is completely wired for lighting fixtures on both walls, for brackets, ceiling and other fixtures. Three of the most popular model chimes are wired and can be tested or inspected. There is a 100-ft. portable cord that can be connected to the outside of the trailer and there are several switches in a built-in desk that can turn lights on in the trailer, making a very attractive display.

With this Mobile Showroom, Starr Electric Supply Co., Houston, is trying a new method of selling lighting fixtures, appliances, and supplies. The firm reports very good results with the display.

Dates Ahead

Public Utilities Assn. of the Virginias, 38th Annual Meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., **Sept. 14-15, 1956.**

Maryland Utilities Assn., 32nd Fall Conference, Cavalier Hotel, Virginia Beach, Va., Sept. 14-15, 1956.

Southeastern Electric Exchange, Engineering & Operation Section Conference, John Marshall Hotel, Richmond, Va., Sept. 20, 21, 1956.

National Electrical Contractors Assn., Annual Convention and 2nd National Exposition, Sheraton - Palace Hotel, San Francisco, Calif., Sept. 23-29, 1956.

American Institute of Electrical Engineers, Fall General Meeting, Morrison Hotel, Chicago, Ill., Oct. 1-5, 1956.

Southeastern Electric Exchange, Sales Section Annual Conference, Tides Hotel, St. Petersburg, Fla., Oct. 3-5, 1956.

Southeastern Electric Exchange, Accounting Section Conference, Miami Beach, Fla., Oct. 11-12, 1956.

International Association of Electrical Inspectors, Southern Section, Annual Meeting, Statler Hilton Hotel, Dallas, Tex., October 22-24, 1956.

Florida Association of Electrical Contractors, Annual Convention and Electrical Exhibits, Balmoral Hotel, Miami Beach, Fla., Oct. 24-27, 1956.

American Institute of Electrical Engineers, Winter Meeting, Hotel Statler, New York, N. Y., Jan. 21-25, 1957.

National Association of Purchasing Agents, Public Utility Buyers' Group, 26th Annual Mid-Winter Conference, Brown Hotel, Louisville, Ky., Feb. 3-5, 1957.

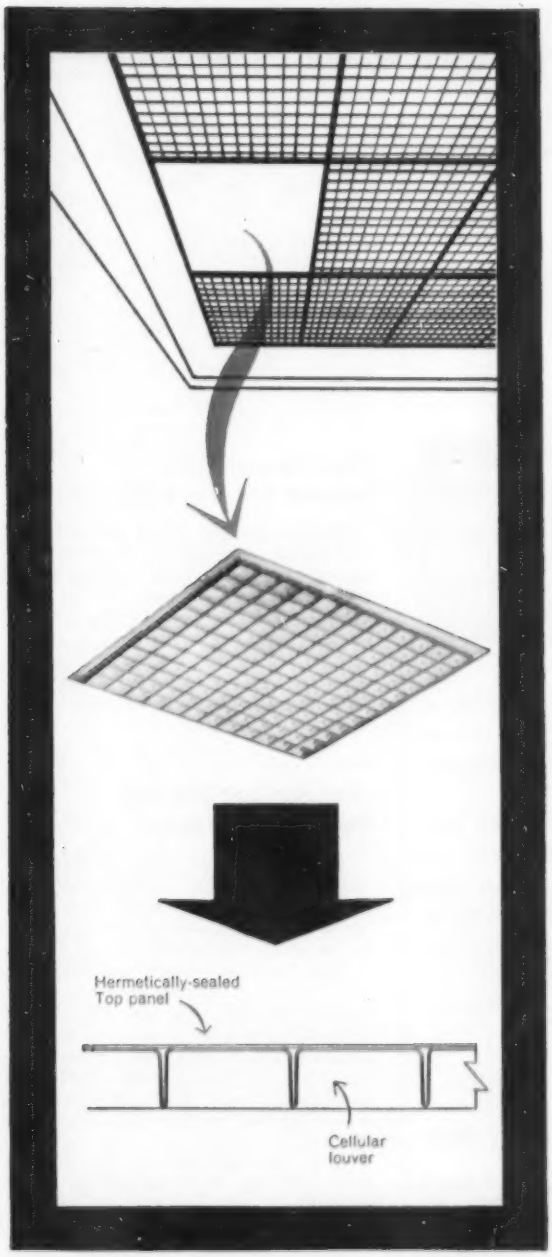
Air Conditioning, Ventilating and Electric Space Heating Exposition, Sheraton Park Hotel, Washington, D. C., Feb. 8-10, 1957.

The Electrical Trade Conference and Exposition, Shoreham Hotel, Washington, D. C., Feb. 12-14, 1957.

Southeastern Electric Exchange, 24th Annual Conference, Boca Raton Hotel & Club, Boca Raton, Fla., April 1-3, 1957.

CURTIS

A brand new product...exclusive new concept



CURTICELL*
louver-diffuser

CurtiCell is beauty, performance, efficiency and economy—a brand new Curtis product.

CurtiCell consists of two hermetically sealed, diffusing vinyl chloride plastic sheets—a flat top sheet and a vacuum-formed bottom sheet providing 25° shielding—that make Curti-Cell the only light control element to diffuse and louver the light, an exclusive new concept by Curtis. CurtiCell louver-diffuser elements are available in 2′ x 2′ and 2′ x 4′ sizes in frosted-clear transparent and translucent white plastic. New Curtis luminaires using CurtiCell will soon be announced, watch for them. Use the coupon to send for CurtiCell information, the newest Curtis product with the exclusive new concept.

* Pat. Pend.

CURTIS LIGHTING, INCORPORATED
6135 W. 65th St., Chicago 38, Illinois

in California
242 S. Anderson St.
Los Angeles 33, California

in Canada
195 Wickstead Ave.
Toronto 17, Canada

CURTIS LIGHTING, INC., Dept. A-8, 6135 W. 65th St., Chicago 38, Illinois
Send CurtiCell louver-diffuser information to

Name_____

Affiliation_____

Address_____

City_____ Zone____ State_____

New distributors named by A-C

APPOINTMENT of five distributors for Allis-Chalmers general purpose equipment in four southern states has been announced by the company.

The new Allis-Chalmers distributors are the McGowan Electric Supply Co., Tallahassee, and Major Electric Supplies, Fort Pierce, Fla.; Colossus Industries, Inc., 213 Airport Drive, Shreveport, La.; Empire Machinery & Supply Co., 409 Water St., Norfolk, Va.; and Mill & Textile Supply Co., Inc., 3130 Third Avenue, South, Birmingham, Ala.

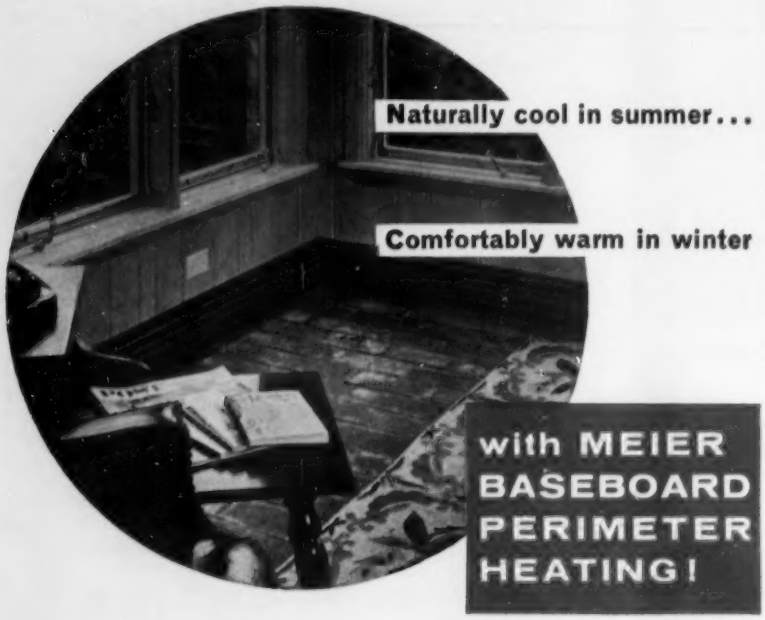
McGowan Electric Supply Company is serving the Tallahassee and Pensacola industrial areas on Allis-Chalmers transformers and circuit breakers. The firm is headed by B. L. McGowan.

Major Electric Supplies is a distributor for transformers in the city of Fort Pierce. Robert Major is owner.

Colossus Industries is representing Allis-Chalmers on industrial controls in parts of Texas, Arkansas and Louisiana surrounding Shreveport. W. W. Crew is president of the company.

Empire Machinery & Supply Co. is a "Texrope" V-belt drive equipment distributor in counties within a 75-mile radius of the city of Norfolk. J. Paul Murphy is president of the firm.

The Mill & Textile Supply Co., Inc., is a distributor for motors and controls, and "Texrope" V-belt drive equipment for the textile industry in Alabama. L. S. Selman, Jr., heads the concern.



MEIER baseboard heaters are ideal for converting enclosed porch areas into comfortable living for winter use, as well as summer. It's like adding another room to the house for year 'round living.

The MEIER unit—attractively finished—is only 6" high and 2½" deep. Completely eliminates drafts and cold spots. Easy and inexpensive to install. No cutting of holes in walls. Heating elements are completely enclosed. Features built-in safety devices.

It's easy to sell the complete line of MEIER electric heating. It's clean heat. Automatic heat . . . electric heating at its finest!

Write for the complete MEIER story about the complete MEIER line of electric heating: WALL HEATERS . . . PORTABLE HEATERS . . . RADIANT CABLE, and of course, the ALL NEW BASEBOARD HEATERS. We have some dealerships and distributorships still open.

MEIER ELECTRIC & MACHINE CO., INC.
3525 East Washington Street
Indianapolis 7, Indiana

New representatives appointed by Berko

AS PART OF an intensive, nationwide program for their new line of glass radiant heating panels, Berko Electric Manufacturing Corporation has just appointed several new representatives to cover various parts of the country. Among these are the following new southern representatives:

George L. Washington, 1541 North Decatur Road, Atlanta 6, Ga., who will cover the state of Georgia and eastern Tennessee.

Ralph B. Shannon, 1204 E. Colonial Drive, Orlando, Fla., who will cover northern Florida.

John B. Russell, 299 North East Third Street, P. O. Box 742, Boca Raton, Fla., who will cover southern Florida.

Florida agents named for Economy

THE APPOINTMENT of the firm of Collins & Ethredge, Tampa and Jacksonville, Fla., as manufacturers' agents for Economy Fuse and Manufacturing Co., Chicago, has been announced recently.

John R. Collins and Ed Ethredge are experienced electrical men and have been located in Florida for a number of years.

Merger announced by manufacturer

THE MERGER OF General Switch Corporation and Norbute Corporation has been announced. The new name will be General Switch Co., Division of Norbute Corp.

This change has been instituted for purposes of expansion and diversification. At present, Norbute Corporation has two active manufacturing divisions, General Switch Company and Metalab Equipment Co. Both companies will continue to operate independently.

The General Switch Company will continue to manufacture and expand its present diverse line of fusible service entrance equipment, enclosed safety switches, and

branch circuit panels and will continue to market their production on a national basis through recognized channels of electrical distribution. No change in factory, executive, and field sales personnel or sales policies and procedures is contemplated.

Heatmore appoints Southeastern agent

APPOINTMENT of David A. Hills, 590 Sherwood Rd., N.E., Atlanta, Ga., as Southeastern representative for Heatmore, Inc., has been announced by Martin L. Kornstein, general manager. Mr. Hills will cover the states of Alabama, Florida, and Georgia.

Brief news notes of manufacturers

MORE THAN 100 Dallas business leaders watched Dallas Mayor Robert L. Thornton turn the first spadeful of dirt to start construction of a $600,000 warehouse and office building in Brook Hollow Industrial District for the General Electric Supply Co.

The 76,000-square-foot brick structure is being built as part of a Texas-wide expansion by G-E Supply. New warehouses in Fort Worth and Lubbock will be occupied by the company in the next few weeks, and another is being sought in El Paso.

Warehousing operations of G-E Supply's appliance and television department for all of North Texas will be conducted in the new building, and the office there will be headquarters for the department's operations as far west as El Paso.

* * *

A NEW Atlantic District regional warehouse and sales offices for General Electric's Construction Materials Division has been officially opened at 3198 Chestnut St., Philadelphia.

The building comprises approximately 26,000 sq. ft. and the air-conditioned office space for the district's sales and commercial service personnel has 3,000 sq. ft.

The warehouse is used to stock the hundreds of types of wires, cables and cords needed to supply the normal requirements of electrical contractors, builders, electric utility companies, electrical equipment manufacturers and industrial customers. This stock, plus the direct teletype service to the G-E factory, will enable the district to provide more efficient and quicker service for its customers in this area.

ELECTRIC GENERATORS

ONLY WINCO GIVES YOU ALL THESE ADVANTAGES

★ SAFE
Propane–safer fuel to use

★ SIMPLE TO INSTALL
No underground tank
No hole to dig

★ EASILY PORTABLE
Speedy-Shift dolly

★ ECONOMICAL
Less maintenance cost
Longer engine life

★ EASILY AVAILABLE FUEL

MAIL THIS COUPON Today!

WINCHARGER CORPORATION
Dept. B.
Sioux City, Iowa

Please send me full information on new WINCO SAFETY POWER engine-generators.

NAME_____

ADDRESS_____

CITY_____ STATE_____

WINCHARGER CORPORATION
SIOUX CITY, IOWA
Subsidiary of the Zenith Radio Corporation

News about people

Robert W. Minett, Jr., has been elected to a second term as president of the **American Home Lighting Institute,** Chicago.

Mr. Minett, who is also vice-president of Thomas Industries, Inc., Louisville, Ky., was re-elected at the

Robert W. Minett, Jr.

membership meeting of AHLI in Atlantic City recently.

Other officers re-elected for one-year terms are **Alfred R. Rosenblatt,** vice-president, and **Eugene Berman,** secretary.

Mr. Rosenblatt is executive vice-president of Globe Lighting Products, Inc., Brooklyn, N. Y. Mr. Berman is president of Leader Lamp Manufacturing Co., New York.

In addition to the officers, the following were elected members of the Board of Governors: **Stanley Framburg,** H. A. Framburg & Co.; **E. H. R. Blitzer,** Lightolier; **Edwin K. Raker,** Progress Manufacturing Co., Inc., and **John C. Virden, Jr.,** John C. Virden Co.

Dr. Arthur A. Brainerd, in charge of the lighting technical program for the **Philadelphia Electric Co.,** has become associated with **Metalcraft Products Co.,** of Philadelphia, as illumination consultant after his retirement from the public utility firm.

Dr. Brainerd has a vast background of experience and research in lighting, lighting production and sales. One of the nation's foremost authorities on illumination, Dr. Brainerd is the author of more than 200 magazine articles and has presented numerous papers before engineering groups. In 1927 he was the winner of the James H. McGraw Prize for the best engineering papers.

He also is the producer of three documentary films, including "Three Dimensional Seeing," "Salvaging Waste Light for Victory," and "Let Us See."

Robert J. Sloan has been named to the post of executive vice-president of **Crouse-Hinds Co.,** Syracuse, N. Y., as announced by **John R. Tuttle,** president and chairman of the board. Mr. Sloan, with thirty years' company service, will coordinate activities of all departments. He will also retain his positions as secretary of Crouse-Hinds Company and executive vice-president of its Canadian subsidiary, Crouse-Hinds Company of Canada, Ltd.

The appointments of **F. Ware Clary** to senior vice-president, in charge of public relations; **Francis M. Truman** to vice-president, employee relations; and **H. B. Adams** to production manager, in charge of production schedules and inventory control, were announced at the same time.

The appointments, with four other current executive assignments, complete the management realignment necessitated by the retirement last year of board chairman William L. Hinds, president Albert F. Hills, and executive vice-president W. C. Blanding.

Raymond G. Howell, of Durham, N. C., has been named city electrical inspector at Durham, succeeding C. S. Whitaker, who retired July 15 after having held the post for 40 years.

For the past eight years Mr. Howell has operated the Howell Electric Company at Durham, which went out of business with his appointment to the city post. Mr. Howell graduated from the Coyne Electrical School at Chicago in 1932.

A. D. R. Fraser, president of **Rome Cable Corp.,** Rome, N. Y., announced that **Frederick S. Marks** was elected

Frederick S. Marks

treasurer of the company at the meeting of the board of directors held recently. **Harry W. Barnard** who has been treasurer of the corporation since its founding in 1936 will continue to serve as vice-president in charge of Finance.

Mr. Marks' association with the wire and cable industry goes back to employment by the Rome Wire Company upon his graduation from Yale University in 1926. He joined Rome Cable as Southeastern sales representative in Atlanta, Ga., in 1945 and returned to Rome to be sales promotion manager in 1949. He was named assistant sales manager in 1950 and sales manager in 1951, and served in that capacity up to the time of his election as treasurer.

Jules A. Mack has been appointed chief engineer of **Hubbard and Company's** pole line hardware division. Mr. Mack has been a research and development engineer at Hubbard for the past year.

An electrical engineering graduate of Catholic University, Washington, D. C., Mr. Mack later taught at

Jules A. Mack

Catholic University and took graduate work there. He served overseas with the U. S. Army Signal Corps during World War II.

Prior to joining Hubbard, he spent five years in various capacities in outside plant engineering with the utility industry.

W. J. Aicklen, executive vice-president of **Houston Lighting & Power Company** in charge of operations, has announced his intention to retire from active duty on September 30. He first became associated with the company in 1927, in the position of commercial superintendent. In 1931 he was elected a vice-president of the company and became general manager of the Galveston division, and served in that capacity until the latter part of 1953, when he moved to Houston to become executive vice-president of the company with responsibility for and supervision of all its operations. Mr. Aicklen stated that following a trip around the world, which he and Mrs. Aicklen

had long planned, they would make their home in Galveston and he expected to catch up on some of his long-delayed hunting, fishing, and golf.

Changes in the organization of the company, effective with the retirement of Mr. Aicklen, have also been announced by W. A. Parish, president. The principal change will bring more actively into the management of the company **F. M. Austin,** presently vice-president in charge of sales, whose new assignment will put under his supervision the operations of the company's nine divisions, the Purchasing Department, Right-of-Way Department, Rate and Research Department, Advertising and Market Research Department, and all Inter-Utility operations. Mr. Austin has been with the company since 1925, and became a vice-president in 1941.

H. F. Staacke, who has been a part of the company's sales organization since 1929, and presently commercial manager, has been elected a vice-president and will succeed Mr. Austin as head of the Sales Department.

Other than the above changes the operating and management organization, which has been in effect since 1953, will continue to function, Mr. Parish said. **P. H. Robinson,** vice-president, who has been with the company since 1928, will continue in charge of operations, including supervision and responsibility for the Engineering Department, Transmission and Distribution Department, Power Department, and Dispatching and Transportation Departments.

Supervision of the Insurance, Claims and Damages, Personnel, Safety and Public Relations Departments will continue under **C. B. Sherman,** vice-president. **John G. Reese,** Comptroller, who has been with the company since 1928, has been elected a vice-president, and will also continue as Comptroller with supervision of the Accounting, Customer Service, and Treasury Departments. **T. H. Wharton,** executive vice-president, will have general supervision of all officers and departments. He has been with the company since 1922, and was elected executive vice-president in 1953.

Leo H. Lipscomb, vice president-sales, **I-T-E Circuit Breaker Co.,** 19th & Hamilton Streets, Philadelphia, recently announced two appointments which fill newly-created posts in the company's sales organization.

Robert D. Cleaves was appointed manager of utility sales. He will coordinate the company's sales program as it pertains to utility activities.

Mr. Cleaves, an electrical engineer from Penn State, was affiliated with Line Material Company for a number of years in sales capacities ranging through field engineer, district

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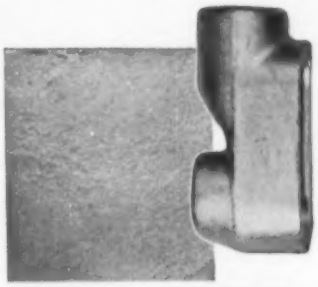

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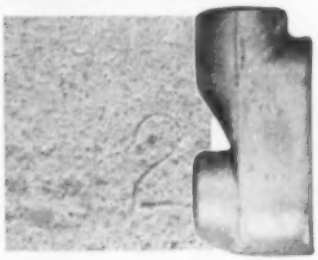

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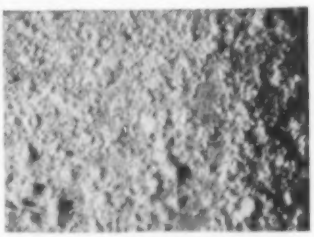

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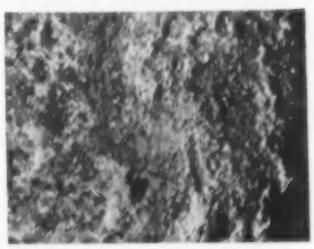

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Contact Your Killark Representative

ATLANTA, 69 Mills St., N. W.
DALLAS, 1901 Griffin St.
BALTIMORE, 11 W. 25th St.

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ELECTRIC MANUFACTURING COMPANY
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EXPLOSION PROOF FITTINGS • VAPOR TIGHT LIGHT FIXTURES
EXPLOSION PROOF LIGHT FIXTURES • SEALED BEAM FIXTURES

manager, and sales manager of that company's Protective and Switching Equipment Division. Immediately

Robert D. Cleaves

prior to joining I-T-E in 1955, he was general sales manager of Anderson Brass Works, in Birmingham, Ala.

Hugh P. Maxwell was named manager of distributor sales. His previous responsibility for coordinating the I-T-E distributor sales program remains essentially the same as in the recent past, though considerably broadened by reason of a sharp ac-

Hugh P. Maxwell

celeration of company activities in sales through distributors.

Mr. Maxwell joined I-T-E in 1952. He is an E.E. who was graduated from Purdue in 1939. Following that, he went to Westinghouse where he was application engineer in their Panelboard Department. This association continued until late '51, with the exception of four years as a radar officer in the Air Force Signal Corps.

John S. Macdonald of Schenectady, N. Y., will become general manager of the **General Electric Company's** Distribution Assemblies Department on June 1. The appointment was announced by William C. Wichman, G-E vice-president and general manager of the Industrial Power Components Division, of which the Department is a component.

Mr. Macdonald has been manager of Manufacturing Operations Services in G.E.'s Manufacturing Services since 1952. In his new capacity he will make his headquarters at Plainville, Conn. The Department has six plants which are located at Maspeth, N. Y.; Norwood, Ohio; Houston, Texas; North Hollywood, Calif.; Seattle, Wash.; and Plainville, Conn.

The Department manufacturers a line of electrical distribution equipment which includes motor control centers, switchboards, panelboards, busway and unit sub-stations.

Donald D. Murray has been appointed lighting representative for the eastern Missouri, southern Illinois and western Kentucky territory of the **Pittsburgh Reflector Company.** From headquarters at 6148 Washington Boulevard, St. Louis 12, Mo., he will handle engineering, sales, and service for the entire line of Pittsburgh permaflector fluorescent and incandescent lighting equipment. Mr. Murray's background includes 25 years experience in lighting engineering and design.

The appointment of **Charles Turbyville** as district representative in middle and eastern Tennessee, has been announced by **Electro Silv-A-King Corp.,** Chicago and Reading, Pa. Mr. Turbyville joins Electro Silv-A-King district manager Perry Sessoms, Jr., of Atlanta, to represent the entire line in this territory. He will contact architects, engineers, electrical contractors, and distributors.

Technical books

for the electrical man

Electric House Heating

NEMA Manual for Electric House Heating, Published by National Electrical Manufacturers Association, 155 E. 44th St., New York 17, N. Y., NEMA Pub. No HE 1-1956, $0.25.

This manual contains recommendations on the amount of insulation for electrically heated homes and a formula for estimating the annual operating costs for electric heating installations. Also included are a standard method for computing heat loss and a method of selecting the proper size of electric heating equipment.

In contrast to the Btu method used in heating manuals for other fuels, this manual is expressed in watts, which is familiar to the electric industry. The manual contains area maps and tables so that calculations can be made for each area of the United States. A calculation on a sample home is included, illustrating how the manual can be utilized.

Supervisors Safety Manual

Published by the National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill., 354 pages, $6.50.

Written by staff engineers of the National Safety Council's industrial department and carefully reviewed by safety experts from business, industry and government, this manual provides foremen with a comprehensive guide to all phases of industrial safety.

Supervisors Safety Manual can be used as a text for group training or self study or as a reference work to solve most of the general safety problems encountered by the foreman in his work day. It provides him with a basic knowledge of accident prevention techniques and human relations know-how.

The manual includes material on the human side of safety, maintaining interest in accident prevention, first aid, protective equipment, housekeeping, materials handling, machine guarding, portable power tools, and fire prevention.

The Supervisors Safety Manual is illustrated with numerous photographs and drawings. It is available to Council members for $3.25.

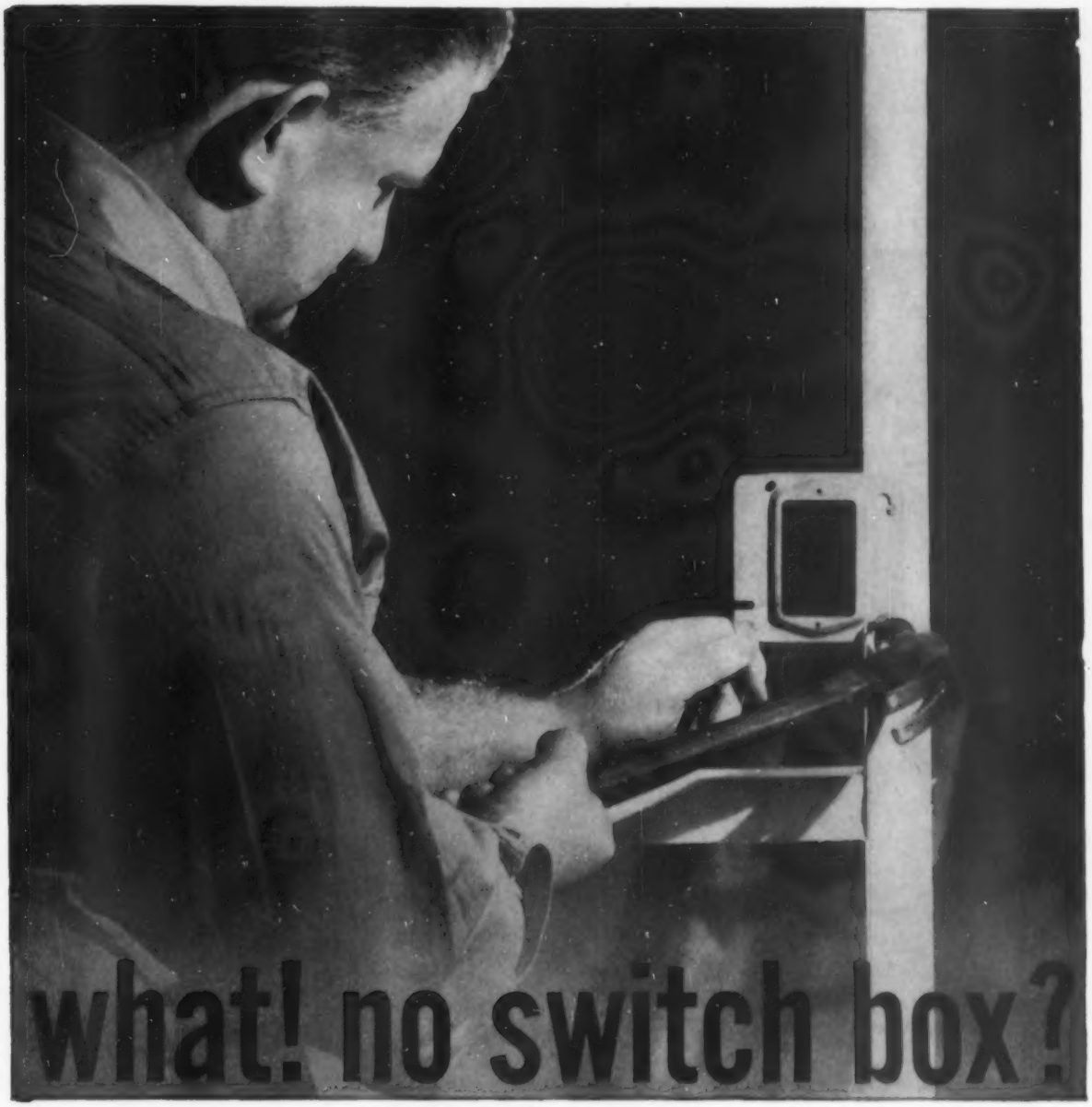
Audio Amplifiers and Associated Equipment

Published by Howard W. Sams & Co., Inc., 2201 E. 46th St., Indianapolis 5, Ind., 288 pages, $3.50

This volume, the seventh in the series, presents complete data on three preamplifiers, 28 audio amplifiers, and 16 custom AM-FM tuners produced in 1955.

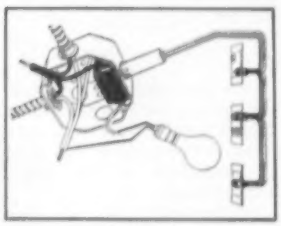
Complete photo coverage, standard notation schematic, parts list, voltage and resistance measurements, and servicing information are presented for each piece of equipment.

Not only is this book invaluable to the technician who services audio equipment, but also it is of extreme interest to the hi-fi enthusiast, experimenter, and hobbyist who wants complete data on audio equipment.



REMCON replaces the switch box with a time-saving plaster ring

Simply nail up a plaster ring and you're ready to hook up from one to five silent REMCON switches. Because REMCON operates on only 6 volts, you eliminate the need for a box at the switch location. With REMCON, you wire a switch in less than half the usual time. It's just one of the ways REMCON simplified low-voltage switching puts more money in your pocket. For every switching job...from 3-way switching to a complete basement-to-attic remote control installation...always reach for REMCON.



REMCON, a division of Pyramid Instrument Corp., Lynbrook, N.Y., manufacturer of the famous AMPROBE snap-around volt-ammeter.

install **REMCON** *simplified low-voltage switching devices*

Forwood C. Wiser, Jr., has been appointed vice-president and Eastern regional sales manager of the **Pittsburgh Standard Conduit Co.,** Pittsburgh, Pa., it has been anonunced by Robert G. McIlroy, company president.

Mr. Wiser, who became a Pittsburgh Standard vice-president last year, was formerly responsible for all

Forwood C. Wiser, Jr.

sales and production activities at the company's new Morrisville, Pennsylvania plant. With the Morrisville operation now a successful one, he will continue to supervise production activities but will also concentrate on sales throughout the Eastern United States.

Charles E. Corrigan, Jr., has been appointed a sales agent in Louisiana and Mississippi for **Diehl Manufacturing Company,** Electrical Division of The Singer Manufacturing Company.

In his new position, Mr. Corrigan will assist distributors in the sale of Diehl fans and ventilators by working with appliance dealers and electrical contractors. His office is located at 504 Delta Building, New Orleans.

Operating out of New Orleans over the past 15 years, Mr. Corrigan has represented manufacturers in Louisiana, Mississippi, and the entire South. He formerly was associated with National Electric Products Corp., of Pittsburgh, working in Baltimore, Philadelphia, and Washington for 12 years.

The appointment of **Rhea P. Lapsley** as vice-president in charge of research and product development has been announced by R. Stuart Keefer, president of **The Okonite Company,** Passaic, N. J.

In this capacity, Mr. Lapsley will continue Okonite's policy of placing major emphasis on the development of new products. His responsibilities will include both the Okonite research laboratories and the Okonite proving ground.

Mr. Lapsley brings to this important task a thirty-two year background of versatile experience in the electrical industry. Starting his career as a lineman in 1921, he later became a power plant operator and designer. Then, in 1936, he joined Okonite to open and manage the New Orleans sales office.

Mr. Lapsley returned to Okonite's headquarters in Passaic as assistant chief engineer, where his duties brought him in contact with many utilities throughout the country. He also helped to install the first 138,000-volt underground cable in South America. Five years later he again joined the sales organization and, until his new appointment, was sales manager of the Wilkes-Barre Division.

In a move to expand and strengthen its sales department, **Bryant Electric Co.,** a wholly-owned subsidiary of the Westinghouse Electric Corp., revealed the following appointments recently as announced by Harold Hey, general sales manager.

Clyde W. Foster has been named sales manager for wiring devices; **Ronald W. Essig** has been appointed

Clyde W. Foster

sales manager for appliance controls, and **Robert D. Howells** has been named manager, marketing services.

Mr. Foster has been with Bryant Electric since 1919 when he first joined the company as a clerk. Since that time, he has served in many sales capacities with the firm.

Mr. Essig, a graduate electrical engineer, has been with the company since 1948 when he joined Bryant as a field representative.

Mr. Howells has been with Bryant since 1946. Prior to that time he worked with the New York Telephone Co.

Following an intensive personal survey of many distributors in the field, **R. H. Jones** has assumed his newly appointed responsibilities as general manager of the Air Conditioning Division of **General Electric.** The division includes three G-E product departments: the Commercial and Industrial Air Conditioning Department; the Home Heating and Cooling Department; and the Weathertron Department.

Mr. Jones, formerly general manager of the G-E Low Voltage Switch-

R. H. Jones

gear Department in Philadelphia, is a native of Stoke-on-Trent, England. He came to this country in 1925 and joined General Electric in 1939 as a member of the company's Business Training Course upon graduation from the Wharton School of Commerce and Finance at the University of Pennsylvania.

In 1951, Mr. Jones was appointed manager of finance for the Switchgear and Control Division in Philadelphia, and in 1953 he was made general manager of the Low Voltage Switchgear Department, the position he held until his recent appointment.

This month one of the three air conditioning components, the Home Heating and Cooling Department, is moving its headquarters from Bloomfield, New Jersey, to Tyler, Texas, where it has recently completed a fifteen million dollar plant.

The appointment of **John J. Neidhart** as applications engineer has been announced by L. M. Grawemeyer, vice-president in charge of sales, Illuminating Division, **The Miller Company.**

Prior to his association with The Miller Company, Mr. Neidhart was lighting engineer with Westinghouse Electric Corp., Cleveland, Ohio. Mr. Neidhart has gained national recognition in the field of engineering of industrial and commercial lighting, and has been a very active member of the Illuminating Engineering Society. In recognition of his contribution to the science of lighting, he has been made a Fellow of the society.

He is co-author of the current IES zonal method of calculating utilization co-efficients and, as chairman of the IES Office Lighting Committee since 1951, he has been responsible for the preparation of the new Recommended Practice soon to be published.

Be sure that you receive

the 18th Annual

ELECTRICAL SOUTH LIGHTING ISSUE

Coming out in October

COMPETENT LIGHTING AUTHORITIES ESTIMATE THAT 2 BILLION DOLLARS WOULD HAVE TO BE SPENT TO BRING LIGHTING IN THE SOUTH UP TO A SATISFACTORY LEVEL.

Findings of the National Lighting Bureau point up the fact that only one out of ten industrial and commercial buildings is lighted to even minimum standards of the Illuminating Engineering Society.

Electrical South's 18th Annual Lighting Issue gives recognition to these facts by presenting in a single issue a symposium designed especially to help you capitalize on the opportunities made possible through the national and local promotion that will result from the National Lighting Bureau's program.

FEATURED IN THIS ISSUE WILL BE AUTHORITIVE ARTICLES ON —

- **Brightness control in lighting designed for stores and offices.**
- **How to sell lighting modernization with the "Certified Lighting Program".**
- **Trends in luminous ceiling design and installation.**
- **Recent developments in lamps and light sources.**
- **Progress report on the "Certified Lighting Program" in the South.**

This important "how to" information will be supplemented with a "Lighting Products Parade" describing and illustrating new lamps, fixtures, and related products; and a special pictorial section, "Lighting Trends in the South", presenting some of the outstanding lighting installations in the South completed during the past year.

Be sure that you don't miss this important issue . . .

If your subscription is about to lapse, renew it today so you will receive your copy without interruption.

If you are not a regular subscriber to Electrical South —take this opportunity to join the ranks of the thousands of successful electrical men throughout the South and Southwest who receive it regularly. For less than 8c a month you can take this valuable "silent partner" into your organization.

Fill out and mail the coupon at right Today!

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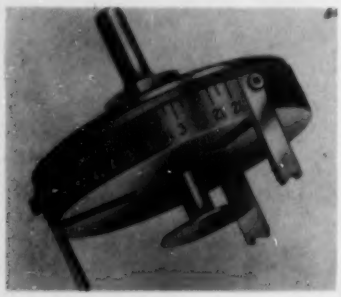
☐ Enclosed find $3.00 ☐ Send bill for $3.00

New products

New metal working tool for heavy duty equipment

A NEW INDUSTRIAL wood and metal working tool for use with heavy duty equipment, Model 500 Dial Saw, uses the same principle of dial setting for accurate size as its forerunners—models 250, 375 and 400. It cuts perfect holes quickly and accurately—any size from 2¼" to 5" in diameter. A turn of the calibrated dial immediately sets the high speed steel cutter blades to the diameter desired.

The tool is made from high alloy steel, with satin-like black rust-resistant finish, and easy-to-read calibrations permanently engraved. Available in three shank types: Model 500 with ½" straight shank, Model 500A with ¾" straight shank, Model 501 with Morse No. 2 Taper shank.



Each Dial Saw is furnished with ½" pilot drill and push-out plug, which are interchangeable, and two sets of high speed steel cutter blades: one set with a cutting depth of 1½" for wood cutting; one set with a cutting depth of 1¼" for metal cutting. The tool is manufactured by Dial Saw Division, Robertson & Ruth, Elmhurst, Ill.

For additional data, ask for item P846, using coupon on page 100.

Reliance gearmotors offer latest design principles

RELIANCE Electric & Engineering Co., Cleveland, Ohio, announces a new line of gearmotors now available in both a-c and d-c from 1 through 60 horsepower. The new gearmotors combine the latest design principles of mechanical gearing and electrical motor development, and are designed and built to give long trouble-free performance under the most adverse operating conditions.

Two-way seals lock oil in and seal dirt out so that the gearmotors may be mounted in virtually any position without oil leakage. Induction hardening provides extremely hard tooth surfaces on tough alloy steel gears, making a perfect combination of strength and wear resistance. The simple gear train is unencumbered by excess mechanisms—with fewer parts to wear, less mechanical friction, and better power transmission. A wide selection of mountings, enclosures, and ratios affords custom gearmotors for all applications.

For additional data, ask for item P847, using coupon on page 100.

Sunwarm lead pre-loomed with aluminized insulation

A NEW "Sun-Loom" lead, designed to increase the speed and economy of electric ceiling heat installations, has been introduced by Sunwarm, Inc., Kingsport, Tenn.

The "Sun-Loom" lead is pre-loomed with protective aluminized insulation, ready for use. This eliminates the former method of hand-threading the lead through a loom from the tie on point to the thermostat box. Since the average ceiling heat job includes several rooms, each separately controlled, the saving in time is considerable.

The new "Sun-Loom" lead also offers a genuine saving to contractors from a cost standpoint. Priced the same as the old-type cable, it ends the contractor's need to stock or purchase his own loom.

Just getting into production, the "Sun-Loom" lead has been approved by electrical and building inspectors, according to Sunwarm.

For additional data, ask for item P848, using coupon on page 100.

Builders special line of kitchen ventilators

A NEW Builders Special line of kitchen ventilators which offers builders a fan line of high efficiency, superb quality, extremely low price, and 50% lower installation costs has just been announced by Fasco Industries, Inc., Rochester 2, N. Y.

The outside doors are the positive-action type, and cushion sealed for airtightness. On Builders Special Models 952 and 953, doors and motors are switch started. On Models 950 and 951, they are actuated by pull chain which is pre-installed on the units before delivery.

The simplified five-step procedure for installing the Fasco Builders Special line in either wood or brick construction 4" to 15" deep cuts installation time in half. For example, no header or cross beam is needed for support. Housings are nailed to the outside sheathing, and the tube assemblies are inserted in the hole. The BX wire is pulled into the box and connected to the pre-wired cover assembly. The unit's motor snaps into place and is held rigid without mounting screws. The smart-looking white grille is mounted with a single decorative thumb-screw to complete the installation.

For additional data, ask for item P849, using coupon on page 100.

Baseboard heating display available from Chromalox

AN OPERATING two-foot section of an electric baseboard heater is mounted in die-cut grooves on a new corrugated cardboard display available to dealers of Chromalox electric home heaters. This 'paper product' display easily withstands the heat given off from the back or mounting side of the baseboard heater . . . proving that mounting side of heater operates at a safe, low heat.

This important safety point is again demonstrated by allowing hand-room to actually "feel" the back temperature. The demonstrator is wired for 110-120 volt a-c power and has a six foot extension for quick plug-in to the nearest outlet. Heat-up is fast, permitting on-the-floor demonstration of the balanced radiant-convection heat output. Baseboard is painted green with the exception of a small end section which is left unpainted to show the special bonderized base which requires no primer. Units are

all supplied unpainted to allow match-painting after installation.

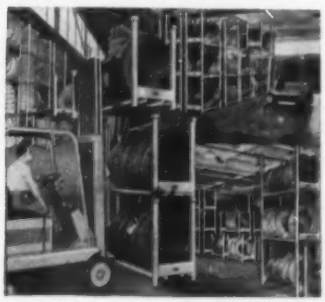
The entire display measures only 24" wide by 26" high which permits effective use on counters, floors or in windows. A handy literature pocket contains a sales spicing pamphlet entitled, "You'll sing a merry tune." The display is available to dealers of Chromalox electric home heaters, which are manufactured by Edwin L. Wiegand Co., 7500 Thomas Boulevard, Pittsburgh 8, Pa.

For additional data, ask for item P850, using coupon on page 100.

Portable wire coil racks simplify storage problem

JARKE Manufacturing Company, Chicago, manufacturers of stock storage systems, has recently introduced a new line of wire coil racks which are said to greatly simplify wire coil storage and reduce warehouse space requirements.

Of soundly welded manufacture, free from fastenings of any kind, each



rack is virtually of one-piece construction for greater safety and to withstand extreme abuse. Three inch under clearance permits fork-lift entrance from all four sides.

All four corner posts are square tubular steel with wideflare nesting caps for easy, uniform, slip-proof stacking. Heavy-gauge formed channel base sections are equipped with non-skid ribbing for stabilizing partial loads. Capacity of each rack is 4000 lbs. Foot caps are available for extra floor protection.

Standard models are Model WR-101 for coil diameters 24" - 30"; Model WR-102 for coil diameters 31" - 36"; Model WR-103 for coil diameters 37" - 42". Other sizes to meet specific requirements can also be furnished.

For additional data, ask for item P851, using coupon on page 100.

Solid top ventilating hood provides more storage space

A COMPLETE LINE of solid top ventilating hoods has just been added to the line of "Push-A-Matic" Deluxe ventilating range hoods by Berns Air King Corp., 3050 N. Rockwell St., Chicago 18, Ill.

These hoods are designed for use

Slater SPECIFICATION GRADE

GROUNDING RECEPTACLES

Send for your FREE illustrated price sheet ... lists all Slater Wiring Devices

S-321-BR

Single receptacle, brown, Nema 125 Volts—15 Amperes, with ears. Available in ivory (S-321-IV) or with no ears (S-320).
List price 80

S-328-BR

Nema, 15 Amperes — 250 volts, with ears. Sturdy bakelite. Compact design. Available in ivory (S-328-IV) or with no ears (S-327).
List price 80

S-396-BR

20 Amperes—250 volts, 3-wire, 3-phase or single phase with grounding, with ears. Available in ivory (S-396-IV).
List price $1.45

SPECIFICATION GRADE

320-BR

Duplex receptacle, brown, Nema, 15 Ampere, 125 Volts, with ears.
List Price . . .
320-BR $2.19
320-IV $2.31

2-CIRCUIT

322-BR

New, 2 circuit duplex receptacle—15 amperes, 120 volts; 15 amperes, 250 volts. Furnished with ears and in ivory (322-IV).

326-BR

Combination 2 and 3-wire duplex grounding receptacle with ears. Also accepts parallel bladed caps that do not require grounding. 15 Ampere, 125 Volts, 10 Ampere, 250 Volts.
List Price . . .
326-BR $2.24
326-IV $2.39

393-IV

New, 2 circuit duplex receptacle, 15 amperes, 125 volts, 2 wire at one end; 10 amperes, 250 volts, 3 wire at other end. U/L approved. List price—
$2.00 BR, $2.10 IV

394-BR

New duplex receptacle takes either tandem or 3-wire crow foot caps, 2 circuits, 20 A-250 Volts, and 15 A-250V.
List Price . . . includes steel wall plate . . .
394-BR $2.44
394-IV $2.54

3200-BR

Intermediate grade, Nema duplex receptacle 15 amperes, 125 volts.
List Price 90

Covers available
Add suffix-3 for receptacles on 3¼" cover
Add suffix-4 for receptacles on 4" cover

Send for Bulletin 37.

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No more shifting box screws from inside to outside ear holes or visa versa. This new "Y-SLOT" cover, an exclusive ARROW design, hooks the screws in either location. Thus, for vertical or horizontal outlet positions, covers can be put on in seconds!

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Same screw holes for horizontal position.

Same screw holes for vertical position.

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where the ventilating fan is installed in the splash plate or back wall so as to leave the cabinet completely clear for storage space. Where the installation is on an inside wall, the Berns Air King "CF" series ventilating fan can be used; where the installation is on an outside wall, the Berns Air King "WF" series fans are available.

These hoods also feature the original Berns Air King "Push-A-Matic" Controls which provide 3-speed push button operation of the fan and light—thus eliminating the inconvenience of hidden switches or costlier wall switch installations.

Like all Berns Air King hoods, the solid top "SH" series hoods are available in 24", 30", 36" and 42" lengths to fit all cabinet depths from 11½" to 13½". They may be had in such "Kitchen Matching" finishes as: Stainless Steel, Baked White Enamel, Baked Coppertone Enamel, and Copper Anodized Aluminum.

For additional data, ask for item P852, using coupon on page 100.

Lighting fixture designed for modern low ceilings

A NEW GROUP of lighting fixtures especially designed for modern low ceilings, and known as the Mohawk series, has been announced by Sylvania Electric Products Inc., 1740 Broadway, New York 19, N. Y.

The versatility of the Mohawk series is achieved by the fact that they are available in two widths; the "Chief", which is 13 3/8" wide; and the "Super-Chief", which is 23 3/4" wide. In addition, the shielding can be obtained in the form of plastic louvers, metal louvers, dished plastic, or a low brightness lens. The louvers were designed for use in stores, lobbies, or hallways where distinctive appearance is important. The dished plastic and the low brightness lens are intended for offices, conference rooms and schools where glare is a problem.

For additional data, ask for item P853, using coupon on page 100.

• easily installed package
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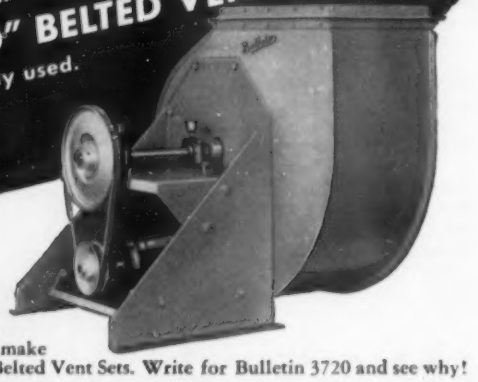

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BUFFALO, NEW YORK

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

INDUSTRIAL EXHAUSTERS BELTED VENT SETS PROPELLER FANS "E" BLOWERS-EXHAUSTERS

Three variations available in new aluminum Utilities

STEBER Manufacturing Co., Broadview, Ill., has announced a new series of Utilities with aluminum housings for PAR-38, R-40 lamps—Series 12.

Three variations are available—No. 12 equipped with base plate for surface mounting or for attachment to 3¼" - 4" outlet box. No. 12-S is furnished without outlet box mounting plate but with spike for pushing into turf for outdoor use.

For additional data, ask for item P854, using coupon on page 100.

New "Y-Slot" box cover saves installation time

THE "Y-Slot" box cover, manufactured by Arrow Conduit & Fittings Corp., 129-30th St., Brooklyn, N. Y., fits all 4" square boxes, for single device installation in any position. With this new cover, it is no longer necessary for installation men to remove and shift box screws from inside to outside ear holes, or vise versa. The

"Y"-shaped slots in each of the four corners, permit the box screws to be hooked wherever they are located. Thus the job of installing covers for horizontal or vertical switches and receptacles becomes very simple and can be done in seconds.

This new "Y-Slot" feature is now included in all Arrow single-device covers for 4" square outlet boxes. More detailed information is available by writing to the manufacturer.

For additional data, ask for item P855, using coupon on page 100.

Memphis heating

(Continued from page 35)

requires 10 kw and a three-ton unit 7¾ kw.

"Being completely automatic and carrying a five-year warranty, the heat pump has a definite appeal to the builders of higher-priced homes.

"Many businesses are using them, too. For example, we installed 10 heat pumps — all five-ton units — in the new Memphis city engineer's building last Oc-

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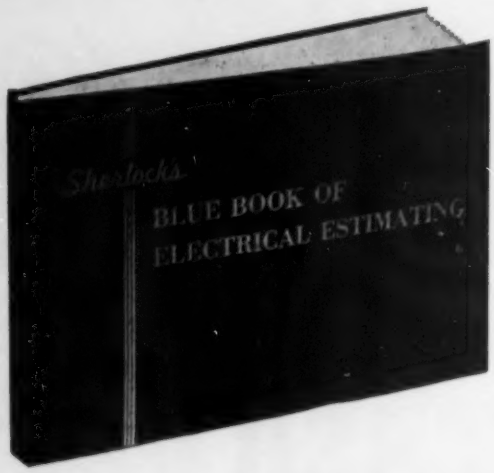

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August, 1956

tober. These 10 units are operated to provide 70 degrees in the summer and 65 in the winter. The fluctuation really is less than four degrees. City employees there are completely sold on this system. One told us 'If I ever build a house, I will certainly have a heat pump.' "

Cook & Nichol installations are made by Walker Heating Co. This company has made some 50 installations and reports owners for the most part are completely happy.

As an example it has a Weathertron five-ton unit in a high-priced, ranch style home of 2,600 square feet. It was a $3,100 installation job. It is operated on a separate meter. The record for the past season shows:

December, 1955—1790 kwh (or about $13.42 for electricity); January, 1956—1690 kwh; February—1570 kwh, and March—1740 kwh.

This, naturally, is a well-insulated home. The same home, with gas, probably would have a lower heating bill, perhaps as much as 20 per cent.

But the electric heating trend is growing every year.

All-electric home

(Continued from page 27)

Mr. Thomas has estimated that his cost for electrical heating will approximate $95 for the entire heating season. Weather data for the Jackson area shows about 2200 degree-days in a normal heating season.

The Mississippi Power and Light Company rate applying to such residences gets down to 1.5 cents per kwhr after 500 kwhr use, and during the months of November through April, the rate drops further to 1.2 cents per kwhr for all kwhr used in excess of 1,350.

NECA-IBEW meeting

(Continued from page 58)

done more than any other to exploit the house wiring market. He is W. Ernest Butcher, owner of Butcher Electrical Service of Dallas, who won a national award on his diligence in cultivating the house re-wiring field.

The appearance of Butcher was in connection with a panel discussion of "Housepower," with Seaman as moderator. Members in addition to Butcher were Paul M. Geary, executive vice president of NECA, Washington; A. R. Johnson of Local No. 324, Longview, Texas, substituting for George R.

Schaull, business manager of local No. 584, Tulsa; Cornish, the NECA research and education director and J. J. Synar, regional supervisor of "Live Better Electrically," General Electric Co., Dallas.

The panel was expected to run but briefly, but continued for an hour and a half. The panel was plied with questions and there was participation from the floor of the convention.

P. H. Robinson, vice president of the Houston Lighting and Power Co., delivered the concluding full scale address of the convention with the subject, "Co-operation within the Electrical Industry." After discussing the industry in general and his utility in particular, Robinson said the central problem is, "How can we continue to maintain a fair price level for our services in the face of continuing inflationary trends?" He continued:

The problem will never be solved by continuing to follow the age-old pattern of charges and counter charges between business and labor. And we must get away from the idea of, 'Let's get ours while the getting is good.'

"If there is not a reasonably consistent relationship between wages and productivity and, if wages far outstrip productivity, then the inevitable result will be inflation or, in other words, a continuation of the declining buying power of the dollar."

Worker Productivity

In the matter of increasing worker productivity, Robinson expressed the belief that management's responsibility includes:

(1) Setting up a sound organization with clear lines of command, with a minimum number of links in the chain of command between the top man in charge and people who do the work.

(2) Management must be ready and willing to buy the most advanced types of tools available to enable men to do a job better, faster and more economically — consistent with safety.

(3) Management must provide leadership through selection and training of foremen and other supervisory personnel.

(4) Beginning at the top, management must create a favorable working climate wherein men may work without a feeling of tension or pressure.

Following Robinson, District Vice-President Edwards of the IBEW discussed in general terms,

SAFE!
SURE!
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Sleeve and "Wrap-Cap" fully approved for general use (600 V.) in branch circuit and fixture wiring.

No other crimp connector ever like it for simplicity and safety! Anyone who can use a pliers can make this vise-tight joint in seconds! Gives you a perfect, pre-fabricated insulating job every time — *all around* and *between* the wires. Puncture proof, with double thickness over wire ends. Steel sleeve is cadmium plated — vibration proof, non-crystallizing. "Wrap-Cap" is made of same long-lived vinyl material used on TW wire.

NO EXTRA TOOL NEEDED

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A5

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the work of the convention and the salient points brought forth by its speakers.

This concluding business session featured spoken tributes by both Edwards and Seaman to J. W. Null, who made his last official appearance as an IBEW international representative when he presided as chairman of the session. Null is retiring, and he took with him the plaudits of both NECA and IBEW.

The 1957 convention is scheduled for March 31 through April 3, in Oklahoma City.

Differential relays

(Continued from page 68)

will bring a question to an imaginative relay tester as to whether there is any current flowing from the current transformers.

If a test link has been provided in each individual lead, a phase angle meter and an ammeter will answer this question beyond any doubt. If test links have not been provided, it may be necessary to short-circuit the current transformers in one breaker, reverse the polarity of the leads to the relay, remove the short-circuit from the current transformers and read the voltage at the relay. This process can consume considerable time and presents a certain safety hazard unless the current transformers are provided with short-circuiting facilities.

There is some danger of damage to the relay if the voltage produced by the reversed current transformer leads exceeds the rated voltage of the relay. This method is not desirable, but can be used to verify connections.

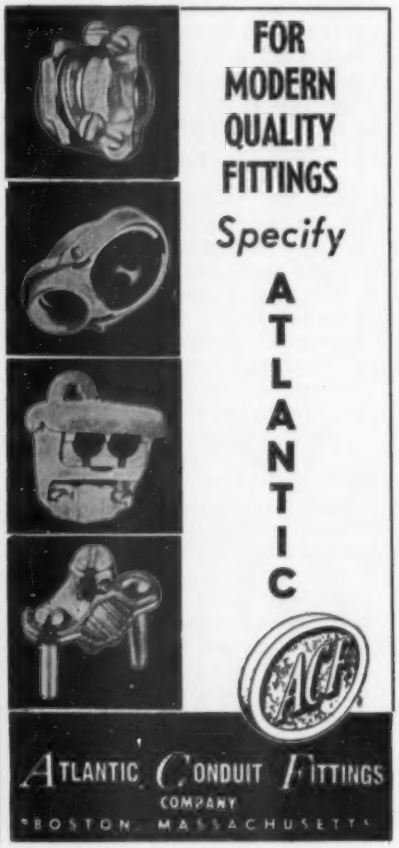
An alternate scheme, if operating conditions permit, is to open all breakers involved except one and read the voltage on the relay as described above. The other breakers can then be closed one at a time. A small change in voltage across the relay coil should be noticeable each time a breaker is closed. This method usually produces satisfactory results if the voltmeter is of sufficient sensitivity and the tester is satisfied with the results.

Both methods are applicable to the differential voltage scheme using current transformers or linear couplers. In some cases, it may be necessary and desirable to simulate load current to test a differential voltage scheme. If the protected bus can be removed from service a test circuit similar to that of Figure 1 can be used. The relays shown in the diagram are of the linear coupler type, although the method works equally as well with the differential voltage type relay.

"Through fault" test

Once a differential scheme has been thoroughly tested for tripping, and the relay performance checked under simulated or actual load conditions, it may not be desirable to place the scheme in service immediately. Through faults may produce disastrous results, despite the fact that all possible tests have been made prior to actually placing the scheme in operation. In some cases, performance curves or old current transformers may not be available, and doubt may exist as to their performance under fault conditions.

One method of checking through fault performance of current transformers is to disconnect the trip lead of the relay from the hand-reset auxiliary relay and connect it to a temporary relay which will seal itself in or sound an alarm after energization by the differential relay. A staged fault corresponding to a through fault



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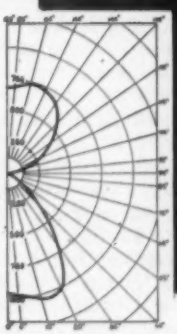

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can then be made, or if the scheme may be left out of service, simply wait for a through fault.

An automatic oscillograph can be invaluable in analyzing current transformer and relay performance under through fault conditions.

Some of the tests and precautions outlined in this paper may appear time consuming and in some instances unnecessary, particularly to those in engineering or otherwise not concerned with field work. No matter how simple and straightforward a circuit appears on a print, there are many possibilities of errors in the installation of differential relays. An incorrect differential action, can under certain conditions, cause an outage of a major portion of a power system.

To illustrate this point, at one time a linear coupler was accidentally left shorted at a major generating station. The linear coupler scheme protected a bus to which all transmission lines were connected. It was not detected because one of the tests described above was not made. This condition existed for several weeks until a fault occurred on a transmission line a short distance from the plant. The differential relay operated, tripping all breakers connected to the bus.

Inasmuch as the station happened to be a double bus station, the differential action itself did not separate the plant from the system, but the action in conjunction with other circumstances did cause the plant and the system to become separated. A major outage occurred which could be traced directly to the misoperation of the differential scheme. Exhaustive tests are justified in most cases in the installation of differential relays.

Make relay plan known

After a differential scheme has been placed in service, it is absolutely necessary that all concerned be notified. This notification should include a simple explanation of the protective scheme, the breakers tripped, and the location of the hand-reset relay. If the scheme is at an attended station, the personnel at the station should be given the above information.

This procedure may not be in line with the policies of some companiees, but experience indicates that operational letters describing the scheme are rarely timed to coincide with the actual installation. A verbal explanation may prevent a major outage if all concerned are notified at the time of placing the relays in service.

Conclusions

There are many different solutions to the problems encountered in the installation of differential relays. The different types that can be made to insure correct installation are limited only by the experience of the tester.

This paper outlines some of the more common problems and suggests some possible solutions. Differential relaying is becoming more and more common, and each installation brings about its own peculiar problems. There is no stock solution, and one method of attacking a problem may be as good as another.

A fundamental knowledge of the circuit, some experience, a good imagination, and a keen interest will solve any problem encountered in the installation of differential relays.

Ceiling heat in TVA area

(Continued from page 31)

Electric heat jobs have grown from "nothing to a substantial part of our business during the last 10 years."

Also working with the electrical contractors and home builders is the Knoxville Utilities Board. Jack Goans is the heating specialist. When applications for FHA or veterans' loans include electric heating proposals, Mr. Goans checks over them. He gives approval if requirements are met. Approved wiring jobs are also given a sign of approval. People planning new homes often bring their plans in to consult KUB.

Season cost studies

KUB for three heating seasons made a study in one of the first subdivisions of Fonde-built, well-insulated homes — those at Meadow Hills. The homes studied had an average of 6304 cubic feet and the average heating bill per season then was $38.92. However, on other electrically heated homes studied for the same seasons, the heating cost per season ranged from $55.19 to $107.64.

For the average home in the miscellaneous group studied for three years, the heating cost was $82.99. That was for an average of 13,720 cubic feet. On the average, a total of 13,656 kwhr were

used. The heating average per square foot of floor space per season was 8 kwhrs at a cost of 4.8 cents.

In the average of the larger homes studied, the heating cost per day ran to 22.7 cents.

In many areas, 75 to 90 per cent of the new homes built in the past five years have electric heat. The higher percentage would apply particularly to the Knoxville area.

William R. New, chief of the Special Studies Section, Division of Power Utilization, TVA, Chattanooga, says: "The major factors influencing this continuing growth are: lower installation costs, safety, cleanliness, convenience, and ease of temperature control. Since no storage is necessary, wasted space and large quantity buying are eliminated. In addition, the relative increase in the prices of competing energy sources has given electric power an extra advantage. The Norris homes had individual room heaters of the radiant convection type. While this method continues to be widely used, one of the most popular types of installation today is resistance wire embedded in the ceiling. . .

"The average residential power use in the Tennessee Valley has increased from 600 kwh to 5000 kwh per year in the last 21 years. However, the all-electric, typically suburban home with electric heating uses approximately 20,000 kwh per year. Electric heating has had a promotional effect on the use of all appliances, not only for the electric heat consumer but also for his neighbors. Tabulations of uses by appliance groups show the summer's use of electric heating consumers to be approximately twice that of the other consumers on the system."

Fast gains in Arkansas

(Continued from page 21)

area is going into homes already built and equipped with other heat, he declared. It is being tried cautiously in wings or additions that are built on homes. In the area served by this utility, ten such installations have been made, using radiant heat.

At this time, this utility company is conducting a summer promotion for both heat pumps and radiant heating, consisting of a purely educational campaign. The purpose, according to the manager, is to even out the summer peak caused by air conditioning. Electricity users who have all-

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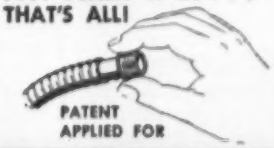

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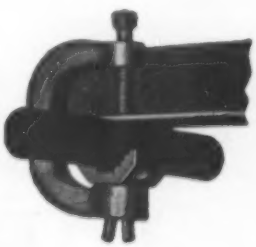
For hanging pipe ½" to 1½" thick to steel beams ⅜" thick.



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year electrical "weather" in their homes will no longer be dismayed by the electricity bills they receive during the summer months.

This promotional campaign consists of advertising and the direct help offered to both consumer and contractor interested in electrical heat.

Controlled load growth

(Continued from page 36)

all concerned were better equipped to deal with the potential users.

Today a specialist in each of the six divisions of Alabama Power consults with potential electric heating customers on matters related to installation and operation, providing estimates on the use and cost to the customer.

Alabama Power from the first has been active in heat pump promotion. Before the first heat pump was introduced to the public, the company joined with other Southern utilities in sponsoring heat pump research by Southern Research Institute, in Birmingham.

Soon afterward the company began aggressive general promotion of the heat pump and from the beginning has installed heat pumps at its own offices and plants over the state. In 1950 Alabama Power created the position of heating and air conditioning engineer and assigned Mr. Cheatham, one of its sales engineers of long service, to heat pump promotion.

The utility developed and screened prospects and assisted directly in closing individual sales to its customers. When General Electric opened a heat pump branch office in Birmingham — a move prompted largely by Alabama Power's cooperation and promotion — the power company began susbstantial advertising of the heat pump; prepared special promotional literature which was mailed to stockholders and customer prospects; prepared and mailed to architects, builders, etc., a comprehensive booklet on the heat pump; trained its appliance service personnel to handle heat pump service, and in many other ways contributed greatly to the promotion and sale of heat pumps.

Educational program

The company is now sponsoring meetings in all its divisions with local managers, home economists, sales engineers, architects, contractors, prospective customers, and others participating. This has brought about a better evaluation and a greater appreciation of the heat pump and of electric heating.

The company also regularly mails literature on electric heating to more than 500 individuals and companies, in addition to its own personnel directly concerned.

To date, Alabama Power has installed or has approved for installation 50 heat pumps in its own operation. And all over the state, company representatives are selling homeowners and businesses on the advantages of electric heating. As reported, the number of electric heating customers is comparatively small, but the growth is steady. A homebuilder at Cordova, Ala., for example, is installing electric heating (ceiling cable) in more than 120 new homes.

As Mr. Cheatham pointed out, Alabama Power wants the advance of electric heating to be solid, permanent, practical, and for that reason, reasonably controlled. The company wants to make certain that its customers understand all the angles — the role insulation plays, the cost, the load, and most of all, the necessity for having a planned installation which will meet the prospective user's needs.

Such a program, the company believes, will make for better installations, happier customers, and a healthy growth in electric heating.

Heat load regulators

(Continued from page 25)

ever several points have become very apparent. One is the necessity for 6 inches of blown in insulation, and the superior value of such insulation over batts or aluminum foil. Another is quicker public acceptance when the load regulator cost, when required, is figured in on the complete cost of the job and not mentioned as being an additional cost over city installations. And finally, the unhappy combination of strip and unit heating.

"We had one particular job," related Mr. Peacock, "with a cathedral type ceiling of exposed boards in the living room. Of course this eliminated cable installation on the ceiling and with wood floors and large picture windows our only alternative was to use unit heaters for this room, instead of the cable heat which had been installed throughout the rest of the house. The difference in comfort, cleanliness and all the other advantages of strip heating were so apparent when contrasted to the unit heaters that the owner

was never completely satisfied."

In Orlando in the past year commercial installations have jumped on the electric heat bandwagon. Small shops, hospitals, city buildings, firehouses, churches, motels, multiple dwellings have all found electric heat profitable and trouble free.

In residential installations, the Azalea Park suburb leads the way. Over 2,000 homes have already been built in this development, the last fifty having electric heat installations. Plans now call for all future homes in this modern suburb to be electric heat equipped.

Bernard M. Acher, sales manager of Phillips Properties, developers of Azalea Park, aptly sums up the story of electric heat in Orlando when he says: "Electric heat was selected above all other heating methods for our Azalea Park Homes, after months of careful study, because of its many advantages, and I sincerely believe it will revolutionize home building of the future."

Lower heating rates

(Continued from page 23)

the 5-ton unit.

As a cooperative gesture to developers, real estate companies, etc., building homes equipped with electric heating equipment, Air Contractors, Inc., provides the sum of $400 for promotional uses.

In a sum-up of his glowing predictions for the future of electric heating in the Kansas City area, Mr. Schumacher pointed out:

"Air conditioning has put the load of the local utility away out of balance with 29% to 31% higher peak in the summer than in winter. After making their tests, I think they've convinced themselves that electric heating will put the load back on a more even year-around keel.

"However, I believe power costs for electric heating are still too high," he said. "If rates are reasonable, the heating business will go to electric heating and to the hermetically-sealed air-to-air heat pump.

"Our company is ready with the equipment, the men and the know-how," Mr. Schumacher said. "We've got the merchandise to do the job.

"And we've proved that operating costs can be competitive," he reminded. "Look at the cost figures for the General Electric Farm Home. They ran only 80¢ a day for heating."

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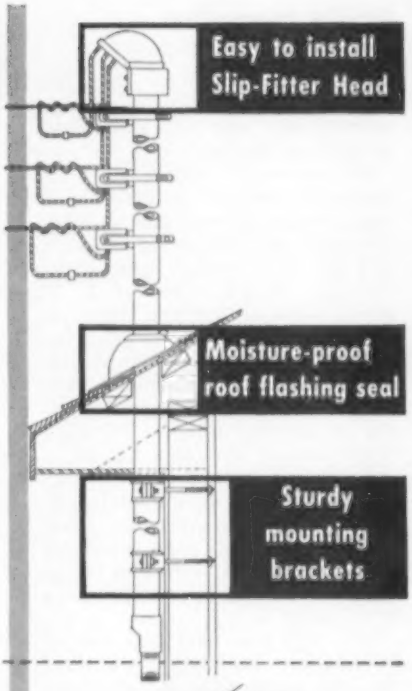

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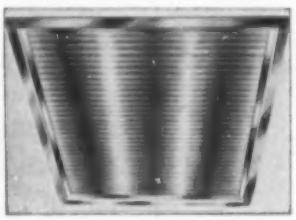

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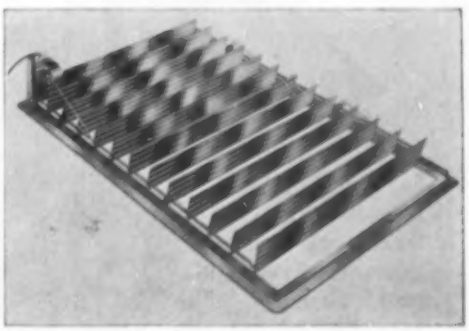

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Utility promotion

(Continued from page 19)

these units, owners of the Dale Building said they were pleased with results and operating costs of the heat pumps.

Mr. Schwanke said much of his company's success in the sale of heat pumps has been due to word-of-mouth advertising. For instance, a 5-ton Weathertron heat pump installed in the home of J. M. Brent, Crystal Springs, Miss., about 30 miles from Jackson, has made such a favorable impression in that area that other home owners in the vicinity are now installing or are planning to install a heat pump in their new homes.

Operating costs on the 3000 sq. ft. Brent home, a completely all-electric house, is averaging about $26 per month for year-round use of the heat pump, according to figures recorded by Mississippi Power & Light Co.

Mr. Schwanke said that Capitol Installation Co., who only entered the heat pump field last January, is soon to be cited by General Electric as a Weathertron pioneer in drafting, installation and service.

Other electrical supply distributors contacted in the Jackson area were optimistic about the future of electrical heating in their territories, but will maintain a wait-and-see attitude before going all out on electric heating appliances and units. Much depends, they say, on future electric power rates in this low-cost natural gas area. However, Mississippi Power & Light Company rates were revised in 1952, and revised again in 1955 to encourage the use of electric heat.

A run-down on several Jackson electric supply distributors revealed different conceptions of the type of electric heating that will sell best in the future.

Mack Johnson, electric department manager of Cabell Electric Co., mentioned two types of electric heat units distributed in his company's 150 mile radius; baseboard heating units, and portable or wall type radiant heaters ranging from small portables to 400 watt flush-wall units.

At Westinghouse Electric Supply Co., Jackson, branch operating manager H. J. Hart showed a 33-page brochure titled "Westinghouse Electric Heating For Homes Guide." This brochure, for the use of the company's salesmen, contains charts and basic data applicable to all electric heat methods. However, the products dealt with principally are the portable and flush-wall type radiant heaters sold throughout the company's territory. According to Mr. Hart, no extra push on heating electrically is anticipated at this time, but the firm is of course receptive to any idea that will increase public demand for heating electrically.

Stuart C. Irby Co., electric supply distributors, is featuring Ceilheat, an electric heating cable that can be installed in ceilings or floors of houses and commercial buildings.

Economic comment

(Continued from page 4)

to illustrate the same results. Thus the advice of successful men of business is a powerful force directing more interest into the practical aspects of the study of economics.

This does not mean that in the drive for more recognition of economics as a practical tool for the

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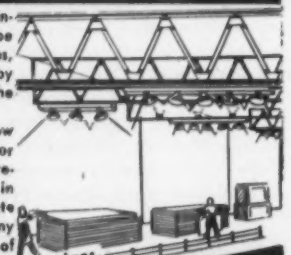

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well rounded individual that the nation is losing sight of the importance of continued research and study into the realm of theoretical economics. The Ford Foundation has recently announced a new program that will allow leading economists to launch studies and investigations of their own choosing in areas of economics. The Fund set up for this purpose amounts to $2.75 million and should pave the way for much study and investigation that may have a most productive impact upon the understanding of economic conditions. It is from these studies that much new knowledge of economic forces may develop.

Through the years the trend of economic study and analysis has generally been toward historical and statistical studies of past conditions. True, such studies have valid uses and add greatly to our storehouse of economic information. Yet it is important to allow individual economists some free rein for personal investigation into economic theory so that the interpretation of this vast amount of data can lead to real economic progress.

The future results of these three operations should certainly improve the status of economics in society and should provide a much more enlightened and informed citizenry.

Insulation in heating

(Continued from page 41)

users of radiant heating satisfied. If one makes a little mistake in building the wrong sort of house, improperly insulated, he does not let this become public knowledge.

"Mistakes will be made at this end of the growth of electrical heating," he said. "To eliminate them, there must be better co-operation between electrical contractors, owners, and utility companies. Radiant heat, in this section of the country, is still on trial. People are approaching it cautiously, and look for any bad qualities in it they can find, or think they find. It is hard to change them from the old to the new. At this time, most people in the South look upon electric heat as a little fantastic — too good to be true, too rich for the family of moderate income. Our selling tactics must stem from health and comfort — two things Americans in all classes will have to the extent they can pay for them.

"We who are familiar with electrical heating feel that many who do not have it now can afford it. Strangely, the young people are the easiest sold. Old people, who would profit from this kind of heat that can be controlled and tailored for each room, are reluctant to change. But it's the young people who are building the homes, and even the little four-roomers can have electric heat. We have the facts and figures here in our office to prove that it is not a luxury beyond their means."

Gas competition

(Continued from page 32)

will continue to increase and as a result the utility is eying the winter load with a view to promoting more load for these months with electric heating. He said the company was pointing out that complete home systems using resistance heating or auxiliary heating has the advantage of low initial cost, great flexibility and unity power factor.

The company's promotional program now in the process of completion will involve promotional work in cooperation with distributors and dealers, according to Mr. Sansbury, who said that training programs in electric heat were being set up with company employees and distributors and dealers in the field.

New connectors

(Continued from page 80)

was required. A rubber seal with a single cement system proved satisfactory, and the ball shape was chosen because it sheds liquids and dirt more readily and is less easily torn, abraded or deformed.

Weathering tests survived

The finished ALCUnectors were then subjected to performance evaluations under unusually severe conditions in the laboratory, on outdoor test racks and in utility distribution systems.

With the interest and cooperation of many operating companies, more than a thousand ALCUnectors have been placed under long-time exposure at various independent outdoor test stations and in the distribution systems of some 40 public utilities throughout the United States.

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weathering tests were started in June, 1953, at highly corrosive Atlantic, Pacific and Gulf coastal points where severe wind and salt spray conditions prevailed. To date no mechanical failures have occurred and no significant changes in electrical resistance have been observed.

Typical of the test areas is Yaquina Head, Oregon, where the atmosphere and the land are seldom dry, salt spray is frequently blown against the test lines and on-shore winds reach velocities of 50 to 100 miles per hour. The ALCUnectors have been subjected to these conditions while under continuous load since installation.

During the past two and one-half years ALCUnectors also have been in service in distribution systems in California and Utah desert areas where they have remained unchanged despite severe salt and alkali-laden atmospheres with very little rainfall. In addition, they have held up well in heavy industrial areas, such as East Chicago, Pittsburgh, and St. Louis.

At the electrical engineering laboratory of the company's Department of Metallurgical Research, Spokane, Washington, ALCUnectors have performed satisfactorily when subjected to accelerated salt corrosion and severe overload tests. No. 4 and No. 6 AWG ALCUnectors, which are intended to carry 135 amperes full load, were completely stable following cycles of 500 amperes a-c applied for twenty seconds in each cycle. Internal resistance as measured at points ¾ of an inch to either side of the weld averaged 22 michrohms initially and remained unchanged throughout ten high-current cycles.

Many tensile tests on weldments provided another quality check. Both conventional and impact-type tests were employed on ALCUnectors. Failures occurred in the parent metal rather than in the weld. ALCUnectors with conductors permanently compressed in the barrels also were subjected to tensile tests. The conductors always failed before the connector showed any deformation.

Switched capacitors

(Continued from page 77)

close the capacitor switch.

By adjusting the value of the voltage drop inserted by the current relay this type of control can be changed from being mainly a voltage type control to being mainly a current control. This type of control can be used just about anywhere that an individual voltage or current control can be used, and depending on the adjustments, combines the advantages of both individual types of controls. The disadvantage lies mainly in the cost of the complete control.

Time clock. The time clock control is essentially an electric clock which switches the capacitors on at a specified time and off at another time. A weekly omitting device allows a day or days to be regularly omitted each week.

Holidays requiring a change in the capacitor controls requires the omitting device to be changed during the seven days before the holiday and similarly reset following the holiday. A spring override is available on some types of time clocks, although most utilities check the device following a feeder outage.

The time clock control can be used anywhere on the system and its advantage is not only in its low cost but assurance when the capacitors will come on and off. The disadvantage is similar to the current control in its inability to sense unusual system conditions requiring the capacitors to be operated at a different time schedule such as on holidays.

Time clock with voltage riders. This control consists of a time clock and a voltage control. The voltage control overrides the time clock only when the voltage limits as set on the voltage relay are exceeded.

This override may be applied in three ways. First, to only sense too low a feeder voltage; second, to only sense too high a feeder voltage; and last, to work for both too high and too low a feeder voltage.

This type of control overcomes some of the disadvantages of a straight time clock control in sensing the voltage conditions along the feeder. It can be used about anywhere on the system. The principal disadvantage of this control is the increase in cost over straight time clock controls.

There are other types of controls built on the same principles outlined above. For example, a time clock can be used in place of the current relay in the voltage-sensitive current-compensated control. Another type of individual control that has good possibilities is the thermal control. This is obviously a type to use where a good deal of the reactive load is switched on and off with temperature. This also could be used in place of the current-compensated relay on the voltage control or to override the time clock control.

For a given system, probably one single element control cannot be used universally. The choice is then to use two or three types where each fits into the picture

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Table I—Estimating cost comparison for single step controls for distribution switched capacitors*

Control method	Units of cost
Time clock	5 (1)**
Thermal	5 (1)**
Voltage sensitive	12
Current sensitive	12
Time clock voltage override	13
Time clock voltage over- and underride	14
Voltage sensitive time compensated	15
Voltage sensitive current compensated	20
Kilovar	24

*Estimate includes PT's and CT's if needed.
**Cost of control without features associated with standard control.

Table II—Summary of advantages and types of feeders for which each control is best suited

Type of control	Types of feeders	Main advantages
Voltage-sensitive	Long urban and rural feeders	Responds to system voltage
Current-sensitive	Short industrial type feeders	Responds to feeder load
Voltage-sensitive, current-biased	Fairly universal	Variety of adjustments
Time clock	Where load varies with time	Low cost and assurance of when capacitors are on or off
Time clock with voltage riders	Fairly universal	Same as voltage and time clock

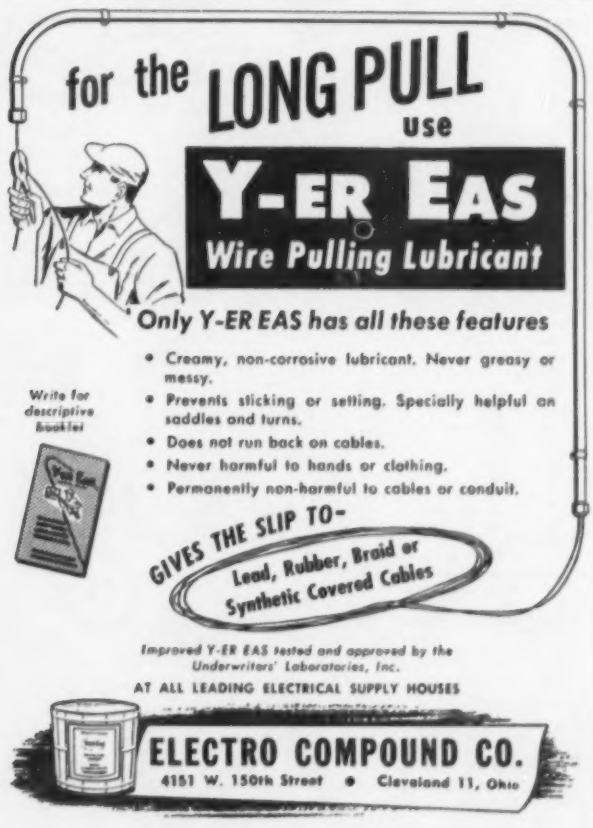
or to use a control utilizing two sensing elements. The cost comparison of the various types of controls are outlined in Table I. The cost include a CT or PT when needed. Such a table is interesting, but the control costs are usually only a fraction of the total capacitor costs, hence the control that will do the required job should certainly be chosen. Obviously these estimating prices will vary; for example, voltage control costs vary quite widely depending on the refinements built into the control.

The bottom of Figure 4 depicts where each control might be used on the typical feeder whose voltage profile is shown at the top of Figure 4. The voltage control must be installed beyond the point on the feeder where the regulator holds the voltage constant. Likewise, the current control must be used near source end of the feeder where a reliable current signal is obtained. Table II summarizes briefly the advantages and types of feeders each control might be used on.

Conclusion

There are very good economical reasons for locating switched capacitors out in the distribution feeders. The loss savings may easily pay for half the total capacitor cost and in any case will probably pay for the switch and controls used on the capacitor bank.

The various types of controls available allow the distribution engineer a wide choice to select from, and their relatively low cost is not a deterrent to use the desirable type.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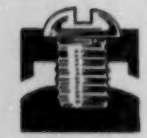

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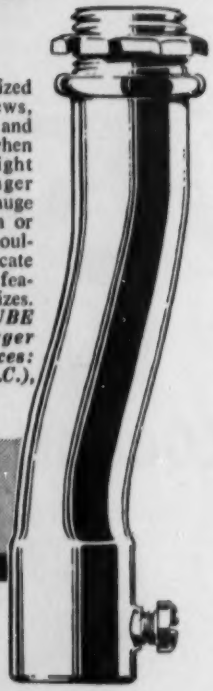

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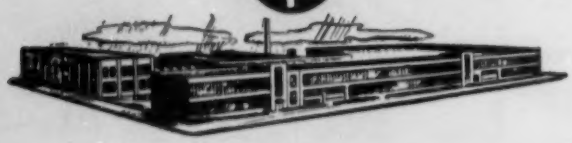

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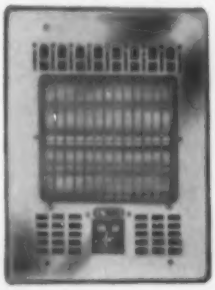

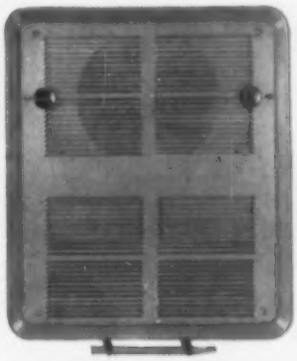

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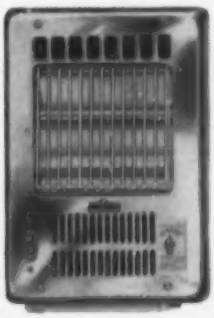

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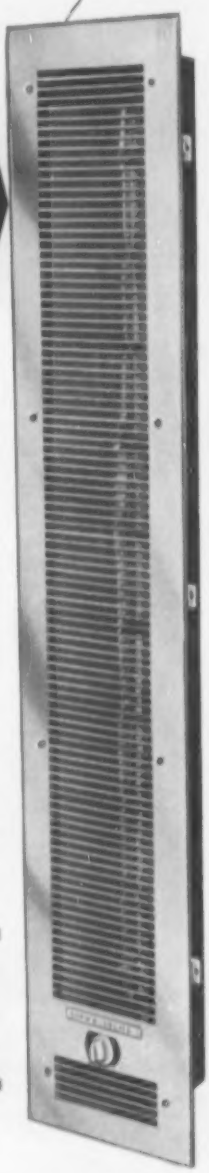

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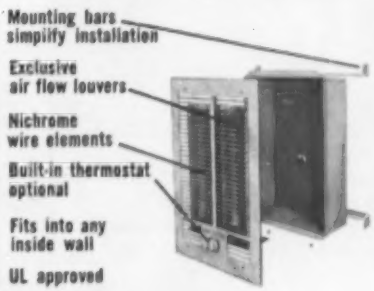

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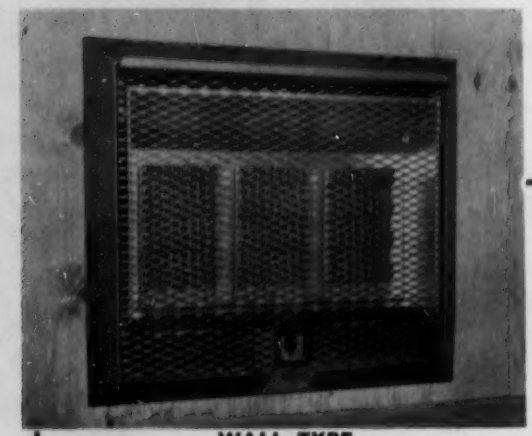

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